The A B C of ARCHITECTURE

by Matlack Price

$3,00

The A. B. C. *of* ARCHITECTURE

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by Matlack Price

PROFUSELY ILLUSTRATED

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IN writing on architecture it is impossible to proceed far without incurring indebtedness to architects, both ancient and modern, and especially to the old architectural savants, whose thoroughly conscientious and scholarly work is performed by no one in this rapidly moving age. There are, today, no such architect-scholars as Viollet-le-Duc, Choisy, Perrot and Chipiez and the many others who made countless careful drawings and restorations of the buildings of antiquity. Their industry has provided exact and authoritative study-material for architectural students for all time, as long as libraries survive on the face of the earth. This, perhaps, was their intention in the life-times they spent in their scholarly research work and careful drawings.

The illustrations of drawing instruments in Part One (Figures 1, 2, 3, 4, 5, 12, 13, 14, 15, 16) were kindly furnished by the makers, Eugene Dietzgen Co., to whom the author wishes to express his thanks.

After fifteen years of architectural writing, the author cannot but feel the existence of a continuous coöperation with his work on the part of architects too numerous to mention by name. Their appreciation of the author's efforts to interpret architecture and popularize a general familiarity with it have always been one of his greatest rewards, and an abiding source of pleasure.

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New York, 1927.

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INTRODUCTION

When you hear the word "Architecture" mentioned, what does it mean to you? Perhaps the great majority of people aren't any too certain about the meaning of architecture, so we will start this book with a quite clear idea of what architecture means.

There are two main divisions—and no reason in the world to confuse one with the other, because they are both separate and distinct. Each division is an important part of the other. In fact, they are the two halves of a complete whole.

The first, we will call "The Practice of Architecture." The second we will call "The Story of Architecture."

The first will interest you for one or both of two reasons. If you are thinking of becoming an architect "The Practice of Architecture" will tell you exactly what you want to know. And if you happen not to be thinking of becoming an architect, a knowledge of how the architect works, and of how buildings are designed and built will open a new world to you and make every building you see mean something to you.

The second part of this book, "The Story of Architecture," should interest anybody, because it increases knowledge and appreciation and enables you to have intelligent opinions about the buildings you see about you. Also, it makes travel abroad mean more to you than it could possibly mean if you had no knowledge of architecture. Practically all our buildings in this country have their style-origin in the older buildings of Europe, and the principal thing our architects do is to take the old European styles of architecture and utilize them in designing our modern buildings in this country.

First, then, let us see how the architect trains for his work, how he serves his apprenticeship as a draughtsman and how he practices the profession of architecture.

And when we know this, "The Story of Architecture" will acquaint us with that part of the architect's equipment, and, at the same time, increase our general knowledge of one of the most interesting and important subjects in the world.

PART ONE

THE PRACTICE *of* ARCHITECTURE

THE
A. B. C. OF ARCHITECTURE

CHAPTER 1

THE STUDENT

NOT so very many people have a perfectly clear idea of how an architect works, or of how a man becomes an architect.

Architecture has been defined as "the art of building beautifully," which is not quite complete. Architecture, as practised, is an art, certainly, but it is also a profession, like that of a lawyer or a doctor. And some part of the practice of architecture is also a business. The practice of architecture is a profession like that of law or medicine because the architect must have a considerable technical training as well as a general education. Let us see what this training comprises, and how it is to be had.

The best training, of course, is to be had in the Architectural Department of one of the large Universities, or in a Technical School. In the University it is possible to begin architectural training in the first year and carry it on, with other and more general studies, through the four years of college. After this it is very desirable, if possible, to follow from two to four years post-graduate work, specializing entirely on architecture. A good alternative to this, considered by many architects as the best preparation, is one or two years post-graduate work in the University and one or two years travel and sketching in Europe.

Every young man wishing to become an architect, however, is not so fortunate as to be able to follow such a long or expensive preliminary training, and we will see, presently, how he is to train for his chosen profession if his time and means are limited.

Let us first follow the University student and see what he learns in the four years and in his post-graduate work.

In the first year he will begin a thorough lecture course on the history of architecture, covering its development from the beginning of building in ancient Egypt through to the present day. This course is usually conducted with lantern slides and with considerable study and reading to supplement the lectures and the notes which the student takes with lectures. At the same time he has two or more courses involving drawing. One of these will consist of a thorough training on the Classic Orders (which you will meet later in this book, in Part II). Another will consist of simple problems in architectural design. A third may be a course in freehand drawing.

Thus, in his first year, the student is getting his essential equipment to go on with.

He may also take a general Fine Arts course, which will give him a valuable knowledge of the development of all the arts, covered in the sequence of the history of civilization.

The second year will add a few more special phases of architectural training. The student will be required to make "measured drawings" (explained later) and will take courses in perspective, in shades and shadows, and in simple building construction. There will be a course in more advanced design problems than those in the first year, and the student's freehand drawing may also be further developed in an advanced course.

The next two years will find the same subjects carried still further in more advanced problems, so that at the end of four years the student will have become not only an able draughtsman, but will also have a thorough knowledge of the essentials of the profession of architecture.

At the same time he is taking courses in higher mathematics in the University schedules and doing a good deal of reading to gain a more thorough familiarity with the history of architecture.

Post-graduate work will involve, usually, concentrated work on design problems as advanced as the actual profession of architecture itself. Most of the students' time will be devoted to the making of these fine and elaborate drawings, which test his mastery of all that he has learned in the various courses he has taken.

He may, at this stage, compete for a Travelling

Scholarship which, if he wins it, will pay his expenses for a year or two of special study in Europe, usually at the American Academy in Rome. If he does not win a scholarship, a year, or even two years abroad may not prove too expensive. Steamship lines now have special low rates for students, and very often two or more have spent a delightful summer at little cost making walking tours through England or France, sketching, photographing and storing up priceless first-hand impressions which will prove invaluable later on. Sometimes it is possible to defray part of the expenses of this sort of study-trip by selling sketches, photographs and descriptions to architectural magazines, on arrangements made before leaving this country.

Some years ago it was considered invaluable for the architect to spend a few years of study at the École des Beaux Arts in Paris, and the same holds true today if the student intends to become the designer of large and important public buildings, or an authority on city planning. The Beaux Arts training specializes almost entirely on large projects, planned in a large way. There are also special courses that perfect the student in brilliant draughtsmanship and over all there is the inspiration of working with exceptionally clever young men from all parts of the world, and the inspiration, as well, of association with the architecture of Paris itself, and the old traditions of the École.

Because of their belief in the value of the Beaux Arts training, a group of New York architects who originally studied there, founded the "Society of Beaux Arts Architects" with a working studio, or *atelier*, where any ambitious architectural student may come and work on problems similar to those of the French Beaux Arts School, under the direction of the Beaux Arts architects themselves, who generously give their time to this work. And every year a "Paris Prize" is awarded, which sends its winner, with all expenses paid, to spend a year in the École des Beaux Arts in Paris.

But let us return to the student who is unable to follow a University course or to spend even a few months in Europe. We will suppose that he has graduated from high school, and he may even, by necessity, be working in some position during the day. For him, there is the correspondence school, through which he may gain enough knowledge to qualify him for a position as draughtsman in an architectural office, where he will be appreciably nearer to becoming an architect.

Through the books and problems in a correspondence school the student will get not only a knowledge of the use of drawing instruments, and how to make drawings, but will also be able to acquire a reading knowledge of the history of architecture as well. It is useless to pretend that his education by this means will be as thorough as it would be by direct instruction, but if he is sufficiently ambitious, he will win out in the end. The self-taught student, indeed if he is really in earnest, very often outdistances the young man from the University who has had everything made too easy for him, and who has allowed the many pleasant distractions of University life to divert him from the real work of acquiring an architectural education.

The most important advice to the student who is gaining his own instruction through a correspondence course is to remind him that the best such course in the world will not do his thinking for him, and that while it can guide and advise him, and do about one-quarter of his training for him, he must supply the other three-quarters himself.

Exactly as in the case of a young man who is ambitious to become an artist—if his ambition *is* real, nothing can prevent him from succeeding. And if his ambition is *not* real; if he is a slacker on hard work, or too fond of amusement, the best and most expensive training will not help him. For the young man who would become an artist or an architect, much of the reward, certainly through his younger years, must come from the joy of the work itself. Remember that the professional man is the outstanding figure in modern civilization, and that his position is a fine and dignified one because he has put in a lot of good hard work to attain it.

A word about helpful additional work to be done while you are, perhaps, working at a necessary job by day and on an architectural correspondence course by night. *Read.* Read every book on architecture that you can borrow or get at the library. Something must be done to take the place of the cultural lectures of the University. Also, if you have access to a library, look over all the architectural magazines each month. They keep your architectural knowledge up to date and keep you from getting too book-learned in proportion to the amount of actual live thought you give to your study and your work.

It is very necessary to know the Classic orders of architecture very thoroughly, and all that you can learn from the books, but any beginner who is studying while he is working as a junior draughtsman in an architect's office will find that he needs to know all he possibly can about modern types of building.

And, if you live anywhere on or near the Atlantic seaboard, there are old houses and other buildings of the days when our architecture was in the making—fine old doorways and ironwork, interesting cornices, beautiful mantels. Spend week-ends and holidays making sketches and measured drawings of these. Such work is excellent practice and highly educational, and you will learn more from it than can be learned by any other means. (How to make measured drawings is told in Chapter 4.)

CHAPTER 2

How to Become a Draughtsman—How the Draughtsman Works—His Equipment—Drawing Instruments and Their Use

The student, now that he has graduated from his University course, perhaps returned from a study-trip abroad, or now that he has completed his correspondence course, is ready to look for a position as a draughtsman in an architectural office. He is entering, at last, the actual doorway to the profession. Some day he will be a practicing architect.

At first, when he enters an office, he must not expect much in the matter of salary, but he may expect much in what he will learn. He may find difficulty in getting a position, even as a junior draughtsman, and when he shows the head-draughtsman samples of his work he is very likely to find that a few measured drawings will make a more favorable impression than his school work.

The demand in a draughting room is for a draughtsman who can "take hold" at once, who can be given a drawing to make, *and make it,* without asking a hundred questions and wasting the time of the other men. Usually the junior draughtsman is put to work making tracings, because he can do this without much supervision. If he is intelligent and studies the drawings as much as possible while he is tracing them, he will learn a great deal. The drawings he traces, in fact, may be the first actual, professional "working drawings" he has ever seen, and he will do well to notice, constantly, how they are made so that he will be able to make similar drawings when he is given his chance.

I would like to say, at this point, that the draughting room in an architectural office is almost invariably a friendly place to work. The older draughtsmen always take a pleasant interest in the beginner, and if his personality is at all agreeable they will go to great lengths to help and advise him. The spirit is a very fraternal one, and many a friendship is formed over the draughting table that later develops into a practicing partnership. The junior draughtsman will do well to listen to the constant discussions that take place in the draughting room, for in this way he will learn much that can never be learned in school. The head-draughtsman speaks with a great deal of knowledge and authority, the result of practical experience, and many a draughtsman has got some of his most valuable knowledge in this way.

The architect himself, moreover, usually has a very helpful interest in the beginner. Knowing what an exacting and ambitious profession the young man has chosen, and knowing how much the beginner must go through before he attains any distinction, the architect does all he can to help him, especially if the young man shows that architecture is the serious intention of his life, and that he means to make it his career. Most architects, too, like to have a staff of draughtsmen who were trained in the office from the first, as every architect has his own methods and knows that his ideas will best be worked out by men who know these methods.

At this point we seem to come naturally to a brief discussion of the draughtsman's equipment, of the tools with which he works.

In an office there is usually a good deal of general equipment, especially in draughting boards, but the draughtsman is expected to have his own T-square, triangles and drawing instruments.

At home, however, the draughtsman will do well to have one or two drawing boards for his own use, and he generally has another T-square and a few triangles. If he has only one drawing board it had best be the convenient size of about 20 x 26 inches. For larger work the "double-elephant" size (31 x 42 inches) is not only convenient but necessary.

Here is a list of the most necessary items of an architectural draughtsman's equipment, which we will discuss in detail:

Drawing board and thumb tacks
T-Square (Figure 1)
45-degree triangle (Figure 1)
30-60 degree triangle (Figure 1)
Architectural Scale rule (Figure 2)
Set of Drawing Instruments (Figure 3)
Pencils, Erasers, Sandpaper block (Figure 4)
Tracing Paper.

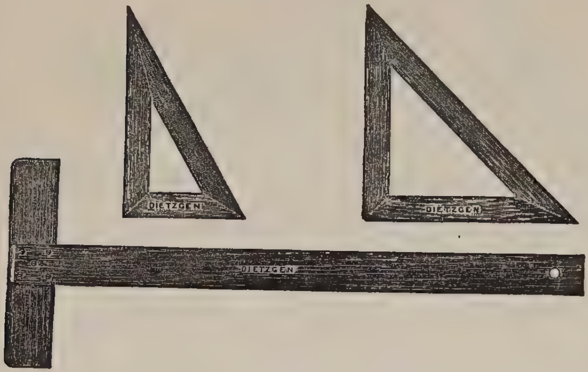
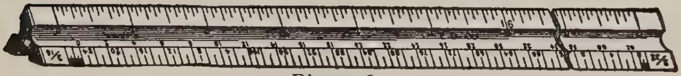


Figure 1



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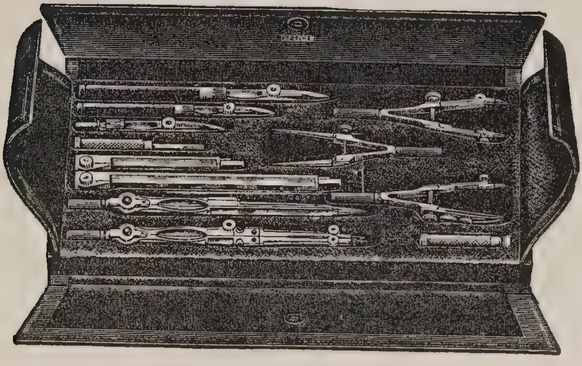

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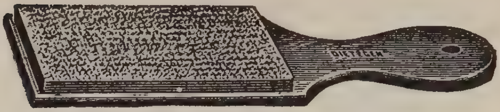


Figure 4

Figure 5 shows a draughtsman's complete outfit, with a protractor, for laying out angles exactly, and a French curve in addition to the items enumerated separately above.

Architectural drawing, from its nature, must be *exact* and *accurate.* Every horizontal line must be actually horizontal and every vertical line actually vertical, otherwise it would be impossible to make the simplest architectural drawing.

It is to assure this that the draughtsman uses a drawing board and his T-square and triangle. The proper position for the T-square is with its head snugly against

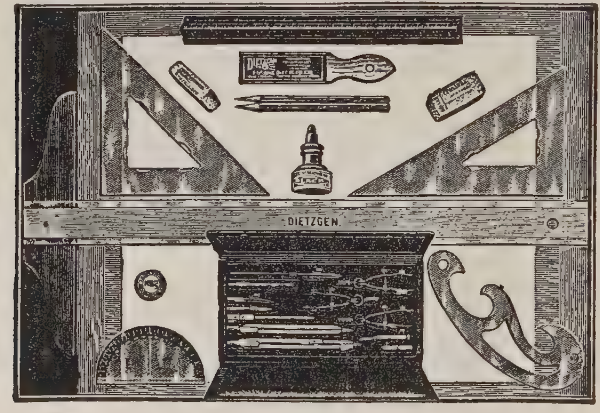


Figure 5

the drawing board (Fig. 6), or serious errors will occur. Properly used, all lines drawn along its blade will be horizontal, and all will be parallel. If a line A — B has been drawn (Fig. 7) and a second line C — D is drawn with the T-square head even very slightly out of position, a seriously inaccurate drawing will result, as the line C — D will not be parallel with the line A — B.

And another thing to know at the very beginning is the position at which to hold the pencil, which should always be kept sharpened to a long, fine point. In order

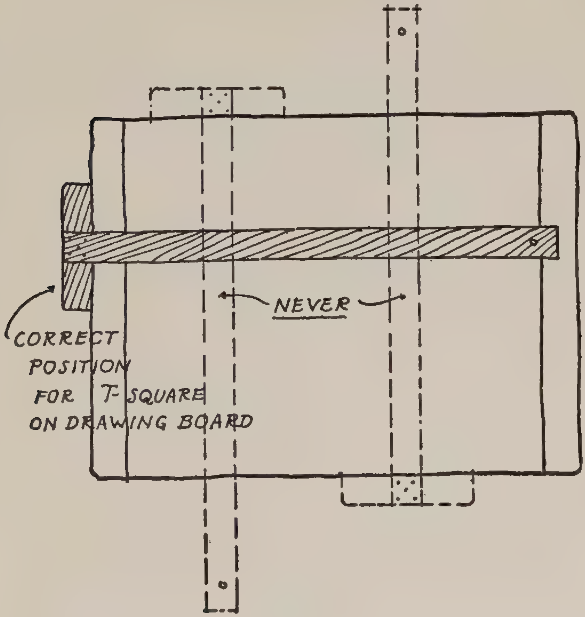


Figure 6

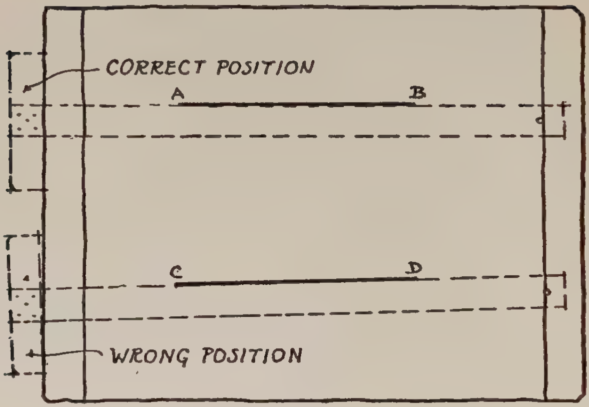


Figure 7

to follow the T-square or triangle exactly, the pencil should incline in toward the blade (Fig. 8, position B) —*never* away from it, as in Fig. 8, Position A.

Properly used, the T-square is *always* dependable, and it is the most used of any piece of draughting equipment.

The 45-degree triangle has many uses, and is mostly used in connection with the T-square, as shown in

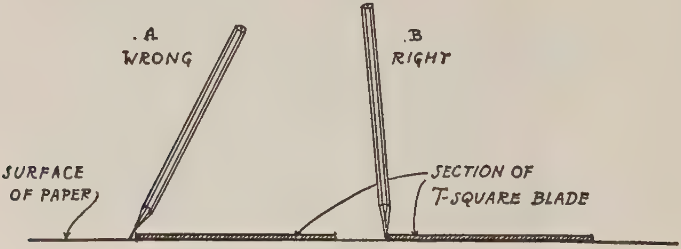


Figure 8

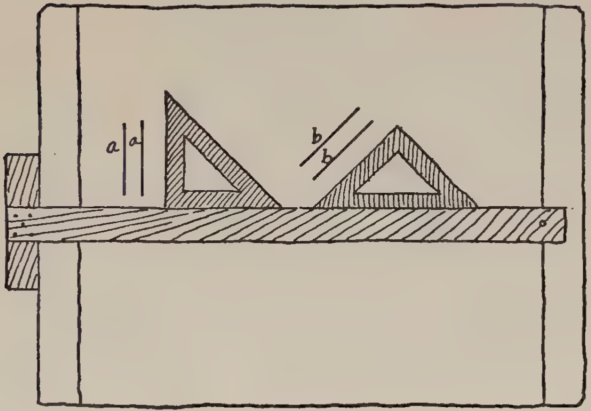
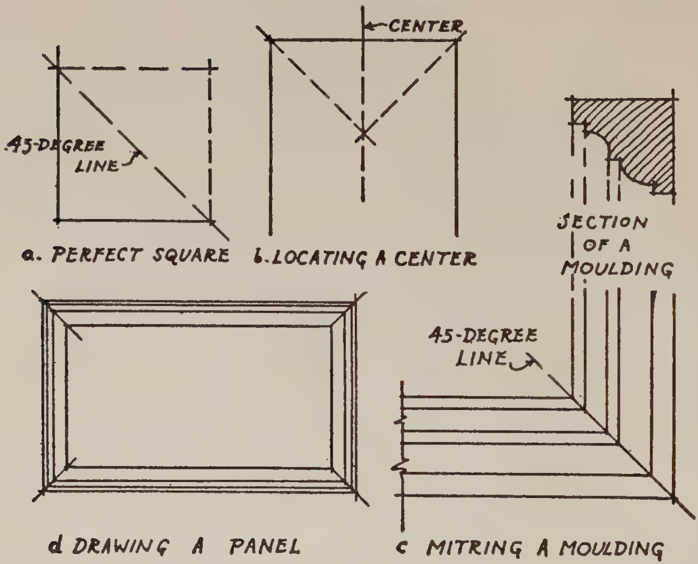


Figure 9

Fig. 9. Placed snugly against the blade of the T-square, the 45-degree triangle will take care of all vertical lines, such as *"aa"* at right angles with the lines drawn along the T-square blade, and also all 45-degree lines, such as *"bb,"* at a 45-degree angle with the horizontal or vertical lines.

Lines drawn at 45 degrees are used by draughtsmen in many ways, of which four will serve to illustrate the importance of the 45-degree triangle. In Fig. 10 we see the 45-degree line used (a), to lay out a perfect square; (b), to locate a center; (c), to mitre the mouldings around a panel; (d), to draw panels. The accurate use of the 45-degree triangle will make more accurate drawings, and make them more quickly than measuring.

The 30-60 degree triangle (Fig. 11) is not used so



a. PERFECT SQUARE b. LOCATING A CENTER

d DRAWING A PANEL c MITRING A MOULDING

Figure 10

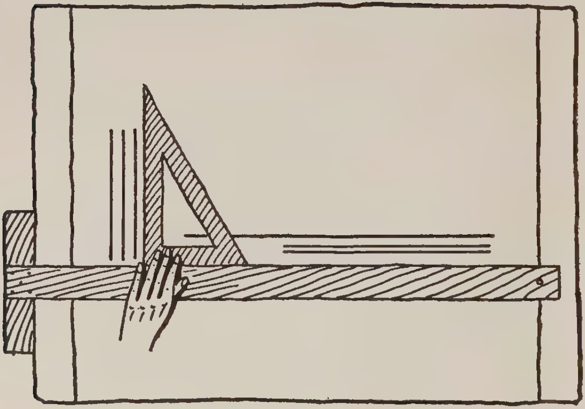


Figure 11

frequently, but is a useful thing to have. The length of its long (90 degree) side is often used to draw longer verticals than may be drawn with the 45-degree triangle (Fig. 9). (Position of left hand, holding T-square and triangle is shown here.)

The architectural scale rule (Fig. 2) is a three-sided rule used for measuring and "scaling" rather than as you would use a ruler.

Its three sides are marked with different scales, beginning with actual inches, 12 to the foot. We will find presently what the other "scales" are, and what they are used for.

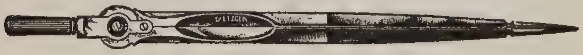


Figure 12

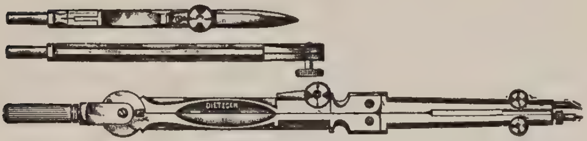


Figure 13

The drawing instruments, which come in cases, consist of:

Dividers (Figure 12)
Large compass, with pencil and pen. Also extension section (Figure 13)
Small bow dividers (Figure 14)
Small bow pencil compass (Figure 14)
Small bow pen compass (Figure 14)
Ruling pen (Figure 16)

The Dividers, as their name suggests, are used to divide spaces exactly. You might wish to divide a distance of 5 inches on your drawing into 3 equal parts, without figuring the division in fractions. You would do it with the Dividers, as in Fig. 15. Dividers, also, are often used to transfer some such dimensions as the width of a door or a window from one part of a drawing to another. Or, suppose you are laying out a stairway on a plan, and want to find how far twelve steps will extend. You would set the dividers at the width of one step, at the size it would be, and then mark off twelve of these steps with the Dividers. You can see at once, a great many uses for the Dividers in laying out a drawing accurately and easily.

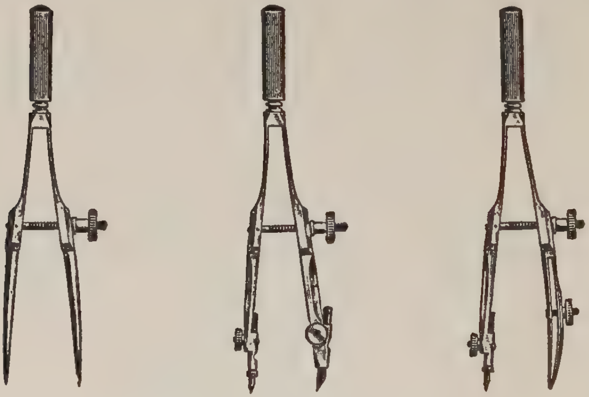


Figure 14

The Compass is used for drawing circles, or parts of circles. The detachable arm with pen or pencil is used according to whether you are making a pen or pencil

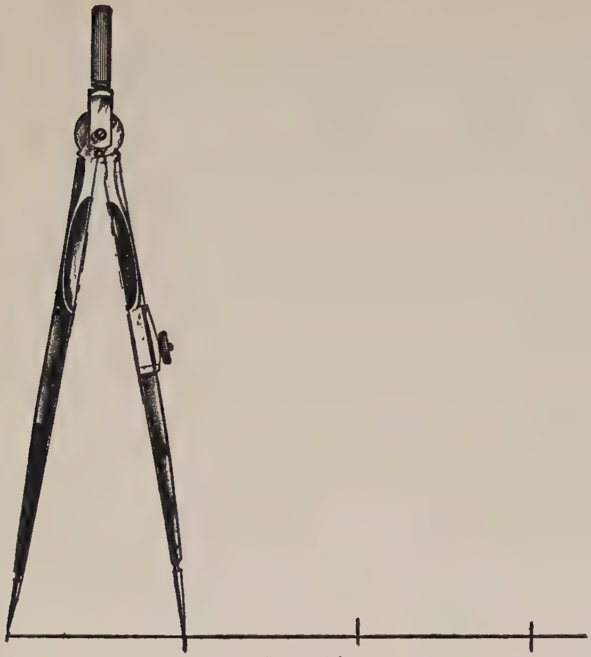


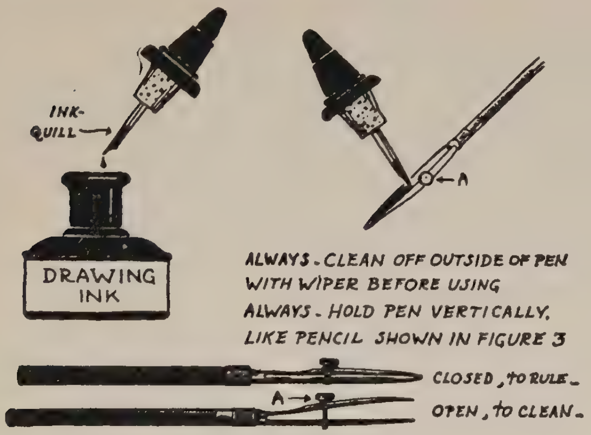
Figure 15

drawing. The extension section fits into the Compass and the pen or pencil arm to lengthen it, in case you need to draw a larger circle than the Compass, without the extension, will make.

The small bow instruments (Fig. 14) are for greater convenience in working on a drawing with small dimensions. The small Bow Dividers, which can be set to hold a certain measurement, are very useful in laying out brick work, or any other drawing that calls for the repeat of a small unit of measurement. The Bow Compass, with pencil or pen, is used for drawing small circles, or parts of small circles, and is more convenient for this purpose than the large Compass.

The Ruling Pen is used for making architectural drawings in ink, and its use is very simple, once you know how. Drawing ink comes in bottles with a quill fitted into the cork, and this quill is used to fill the ruling pen (Fig. 16). With about half an inch of ink in the pen, the thickness of the line you will draw will be regulated by the screw (A) which opens and closes the two blades of the pen. The most important thing to remember is to *always* wipe the *outside* of the pen blades perfectly clean of ink. If there is any ink on the *outside* of the ruling pen, ink will run under your triangle or T-square blade and spoil your drawing. With the outside of the pen wiped clean, it can be used exactly as a pencil is used to draw along a T-square blade or the side of a triangle. The position at which you hold a ruling pen is very important. It should be held perfectly vertical, so that the line it rules will exactly follow the T-square or triangle (see Fig. 8, on how to hold pencil). *And the screw is always on the outside.*

Pencils. Several different kinds of pencils are used by architectural draughtsmen. The "hard" grades are used for laying the drawing out, because they take a finer point and hold it longer. Grades from H to 6H are used for this purpose, and softer pencils, from B to 5 or 6B are used for sketching, and for drawing the profiles of mouldings in "full size" detail drawings.



ALWAYS - CLEAN OFF OUTSIDE OF PEN WITH WIPER BEFORE USING
ALWAYS - HOLD PEN VERTICALLY, LIKE PENCIL SHOWN IN FIGURE 3

Figure 16

The draughtsman usually has a fairly hard rubber, for actual erasing, and one of the softer rubbers for cleaning up his drawing.

The Sandpaper Block is both useful and economical. It consists of several small pieces of fine sandpaper mounted on a wooden handle (Fig. 4). After sharpening his pencil to expose about half an inch of lead, the draughtsman brings this to a fine point by rubbing it on the sandpaper, and as the point wears blunt it is easily made needle-sharp again by a few rubs on the sandpaper.

Tracing paper is used a great deal by architectural draughtsmen, and in addition to wide rolls, the draughtsman also has narrow rolls, which he uses for the rough preliminary study of his drawings and for transferring profiles of mouldings from one part of a full size drawing to another.

With this equipment we are now ready to go through the process of making a set of drawings. To keep this discussion as simple as possible, we will assume that the drawings are for a small frame house in the country. The principles are the same for any set of architectural drawings.

CHAPTER 3

MAKING A SET OF DRAWINGS—DRAWING "TO SCALE"

THE first thing to know about architectural drawings (meaning working drawings) is that they are all drawn to "scale," except the actual size details (called "full-size"). Therefore we need to know exactly what is meant by "scale."

For the sake of clearness we will take one inch as a unit of scale, and we will consider a drawing drawn so that it is in a scale of one inch equalling one foot.

Perhaps the easiest way to make this clear is to imagine that you are a man six feet tall, but that you are reduced to a size of exactly six inches tall. Then, of course, your foot rule would be only one inch long, and everything else would be in proportion. A room ten feet square would be ten inches square and a door three feet wide would be three inches wide.

So, in making architectural drawings, where everything must be in exactly the right proportions, architects take a certain "scale" at which to make their drawings. The scale at which the plans of the houses and other buildings are drawn is the scale in which ¼ inch equals one foot, or as it appears on the plans ¼″ = 1′0″. Dimensions in feet and inches are thus indicated on plans. 10 feet 6 inches is written 10′6″.

The scales used by architects are marked off on the three faces of the architectural scale rule. The scale in which every actual foot in the building is represented by ¼ inch on the drawing is the most used scale, and large scale detail drawings, often made to show elaborate pieces of construction like stairs and such things, are drawn at ¾ inch to the foot, 1 inch to the foot, and even as large as 1½ inches to the foot.

On the scale rule (Figure 2)* will be found a ¼ inch scale with one of the ¼ inch spaces marked off in 12 small divisions, each one of which, at this scale, is an inch. To illustrate how this scale works; if you wish to show a room 16 feet square on your plan, you draw it actually 4 inches square, because 4 inches are made up of 16 quarter-inches, and each quarter-inch equals one foot. Or, in "reading" a plan already drawn, if a room measures 3 inches square, you translate by scale and know that it is 12 feet square, because 3 inches are made up of 12 quarter-inches, and each quarter-inch equals a foot.

I am not attempting, in this book, to give anything resembling lessons in architectural draughting. The purpose of this chapter is to outline in a general way the method by which architectural drawings are made.

Before an architect begins to make the working drawings for a house, the drawings from which the contractor will build it, he makes a perspective drawing (Fig. I), often in color, so that the owner (who is called the client) can see what the house is to look like. This perspective drawing is shown with rough plans, and the whole matter is thoroughly discussed between architect and client. When the general idea of the house, as well as the plans, have been approved by the client, the architect makes the working drawings, which are drawn at the scale of ¼ inch to a foot.

---

* Other scales provided on the architect's scale rule are: 3/32, 3/16, ⅛, ¼, ⅜, ½, ¾, 1, 1½, 3 in. to the foot, 1/16 in.

Sometimes the architect makes a scale model of the house, shown in its grounds, all in miniature, and the making of such models is explained in Chapter 5.

In making the working drawings, the architect starts with the plans. First the cellar and foundation plan is laid out. When this is completed, tracing paper is pinned over it with thumb-tacks and the first floor plan is drawn. Over this another sheet of tracing paper is pinned, and the second floor plan is drawn. By this means the plans are drawn quickly and accurately, and the use of tracing paper, through which the plan below may be seen, insures accuracy in getting partition walls upstairs over the walls downstairs, in laying out stairways and chimneys so that they carry up through.

The ¼ inch scale plans show all the principal things the builder needs to know. All door and window openings are shown, and various notes refer to large scale drawings of details, or to portions of the written specifications (described presently). A portion of a ¼ inch scale plan is shown in Fig. V, and the whole plan, greatly reduced in size, in Fig VI.

In addition to the plans, the architect draws all four exterior sides of the house, also at the scale of ¼ inch to a foot. These are called "elevations" (Fig. VII).

The scale drawings usually include also, a section, which shows all the construction that would be exposed to view if you imagine a house cut in two as you might cut a loaf of bread in two. Looking at the cut portion of the loaf of bread you would see the thicknesses of the bottom, top and side crusts, as well as the internal cellular structure of the bread. In a sectional drawing of a house the purpose is to show the thicknesses of floors, the construction of the roof, and other details not so clearly shown on the elevation. Sections, also, are often used to show stair construction and internal construction of all kinds, and these drawings form a very important part of any complete set.

To complete the drawings, such special features as the stairway, mantelpieces, and panelling may be drawn at a larger scale, often as large as 1½ inches to a foot. These portions, too, are drawn at actual size, called "full size" by architects, and lettered on the drawings "F. S. D.," meaning "full size detail." (See Figures 25 and 26.)

All the scale drawings are carefully traced, on either paper or tracing cloth and it is from these tracings that the blue prints are made. Several sets of prints are made, as the contractor needs a set, the client wishes one and the sub-contractors who are installing lighting and heating must each have one. The original drawings and the tracings from which the blue prints are made remain in the architect's office. The blue prints are made just as prints are made from Kodak negatives.

In addition to the drawings, scale and full-size, which an architect makes for a house, he also writes what are called "specifications," in order to make sure that the contractor will build the house exactly as it should be built. The specifications state exactly what kinds and grades of materials must be used, and often state, too, the exact way in which certain portions of the work must be done. As you can imagine, the writing of specifications demands a good deal of exact knowledge on the part of the architect. In the larger offices a specialist on specifications is employed to write them.

With the sets of plans and specifications it is possible for several contractors to make accurate estimates on the cost of building the house. When these are handed in, as "bids," the architect and client decide which bid they will accept—and the work is ready to proceed.

The further relation of the architect to the building, and a brief discussion of architecture as a profession will be found in Chapter 6.

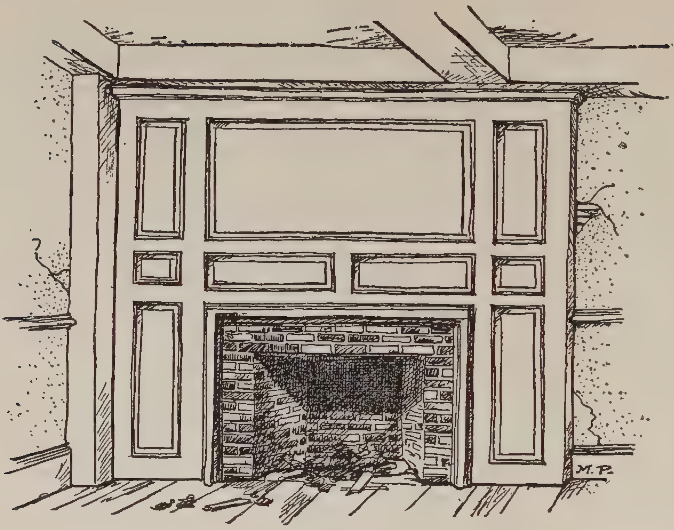


Figure 17

CHAPTER 4

MAKING "MEASURED DRAWINGS"—SCALE DETAILS —FULL SIZE DETAILS

In making measured drawings the process is the reverse of the process just outlined for making scale drawings. In making scale drawings you show whatever is to be built at a small scale so that it can be executed at actual size. In making measured drawings you work from something that is already executed and reduce it to scale in your drawing.

Let us suppose that you have access to an old early Colonial house in which there are panelled interiors and fine old mantelpieces, and you wish to make an accurate architectural drawing of some of these details.

The special equipment for making a measured drawing includes a tape measure or a long folding rule (6 feet long, preferably), a screw-driver and a strip of lead about 1/32 of an inch thick. Lead-foil is too thin for the purpose, as we will presently see. If such lead as you can obtain is too thick you can hammer it out on a stone until it is thin enough.

With this equipment and a number of sheets of drawing paper fastened to a small drawing board with thumb-tacks, you are ready to start work.

You first make a rough sketch of the detail you wish

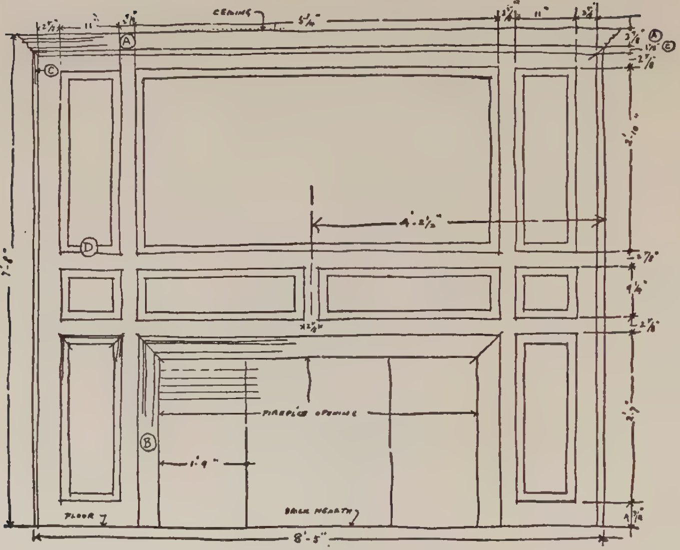


Figure 18

to record—a mantel, for instance, as in Fig. 18, and on this sketch you make notes of all the principal measurements, in feet and inches. The method of noting these measurements is also shown in Fig. 18.

You are now ready to record at full size the profiles of all the mouldings. Taking the strip of lead and the screw-driver, the lead is pressed into every contour of the moulding, carefully removed and laid on a sheet of paper. A pencil outline is made, following the form in which the strip of lead has been bent, and this moulding profile is "keyed," or located on the general sketch by means of letters A, B, C and so forth, as shown in Fig. 18 and Fig. 19, which shows the profiles

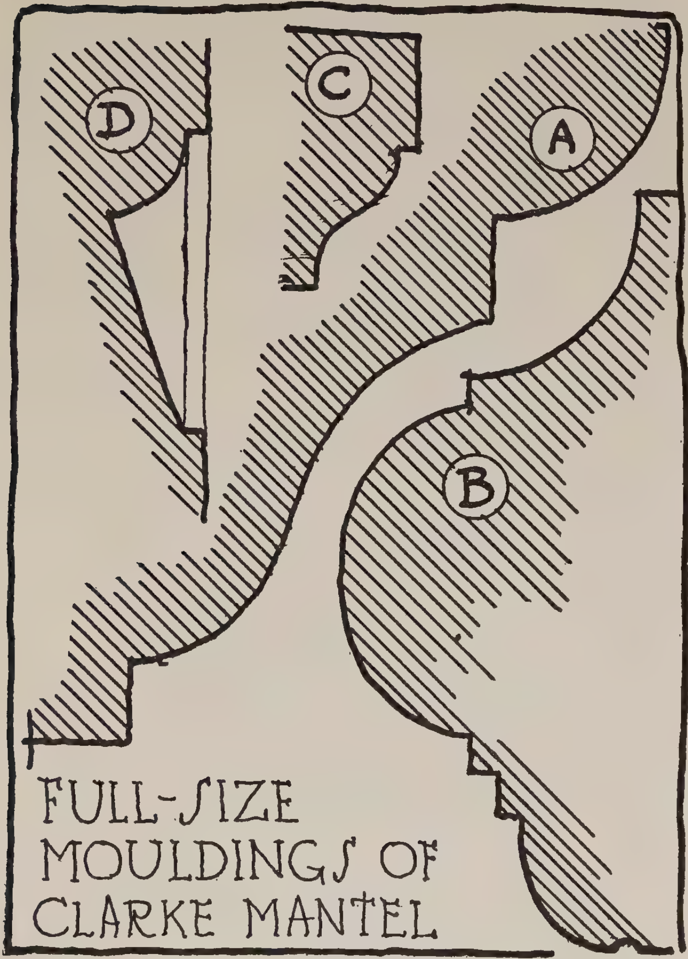


Figure 19

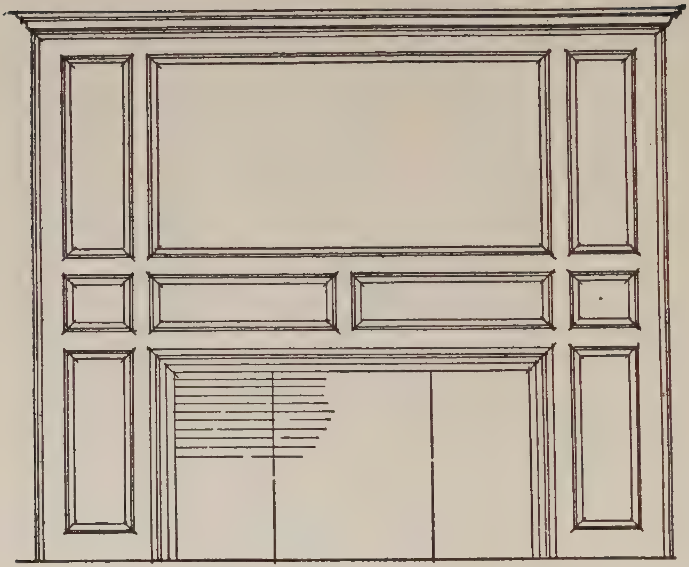


Figure 20

as obtained by the lead. After transferring a profile to the drawing paper, the lead is flattened out and the other mouldings are similarly recorded. If there is any carving, this should be most carefully drawn, full-size, with notations as to depth or height of the carving. These records complete your "field notes" for that particular mantelpiece, and the same method is used for any other details, or for the complete measuring and recording of a whole room, or the exterior of the building. For exteriors, and even for the measuring of a room, it is almost necessary to have some one help you, as it is quite difficult to get the long over-all measurements alone. The holding of one end of the tape measure while you make the readings is all the assistance needed, but it is often quite important.

The measured sketches are then taken home and, at leisure, careful finished drawings are made of them, as in Fig. 20 which shows how the notes in Figs. 18 and 19 are used. With the scale drawing the full size moulding profiles should be incorporated, and, if possible, a photograph.

Few architectural exercises are better training than the making of measured drawings, because you become used to measuring accurately and reading measurements accurately and you learn the relationship between drawings and actual details of buildings. And in addition to this you record and preserve many fine old pieces of work in such an accurately architectural manner that they could be recreated or reproduced.

Such material, since it represents original research work, often proves valuable to an architect in later years, when he is engaged on work involving similar treatment.

Figures 21 and 22 show complete studies in measured drawings, and give an idea of the neatness and completeness with which this kind of work should be done.

The making of scale details is simply drawing at a scale larger than ¼ inch to a foot. 1½ inches to a foot is the scale most often used, and it is sufficiently large to show the more elaborate parts of an architectural design so that the drawings can be "read" clearly

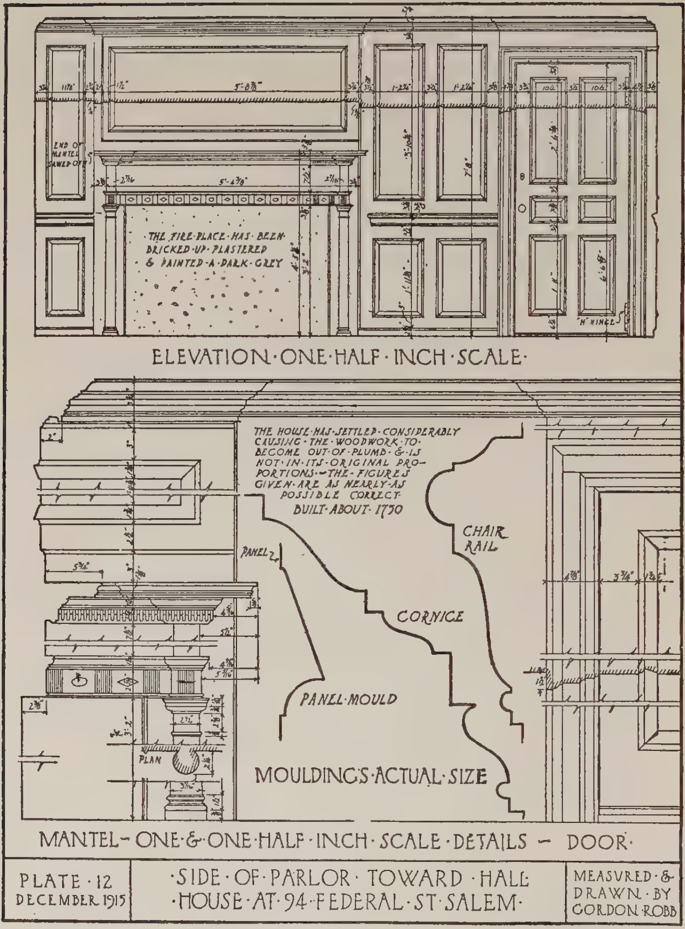

END OF MANTEL SAWED OFF
5'-0⅞"
5'-4⅞"
THE FIRE-PLACE HAS BEEN BRICKED UP PLASTERED & PAINTED A DARK GREY
"H" HINGE
ELEVATION · ONE · HALF · INCH · SCALE ·
THE HOUSE HAS SETTLED CONSIDERABLY CAUSING THE WOODWORK TO BECOME OUT OF PLUMB & IS NOT IN ITS ORIGINAL PROPORTIONS — THE FIGURES GIVEN ARE AS NEARLY AS POSSIBLE CORRECT
BUILT ABOUT 1750
CHAIR RAIL
PANEL
CORNICE
PANEL MOULD
PLAN
MOULDINGS · ACTUAL · SIZE
MANTEL – ONE & ONE HALF · INCH · SCALE · DETAILS – DOOR ·
PLATE · 12
DECEMBER 1915
· SIDE · OF · PARLOR · TOWARD · HALL ·
· HOUSE · AT · 94 · FEDERAL · ST · SALEM ·
MEASVRED · & DRAWN · BY GORDON · ROBB

Figure 21

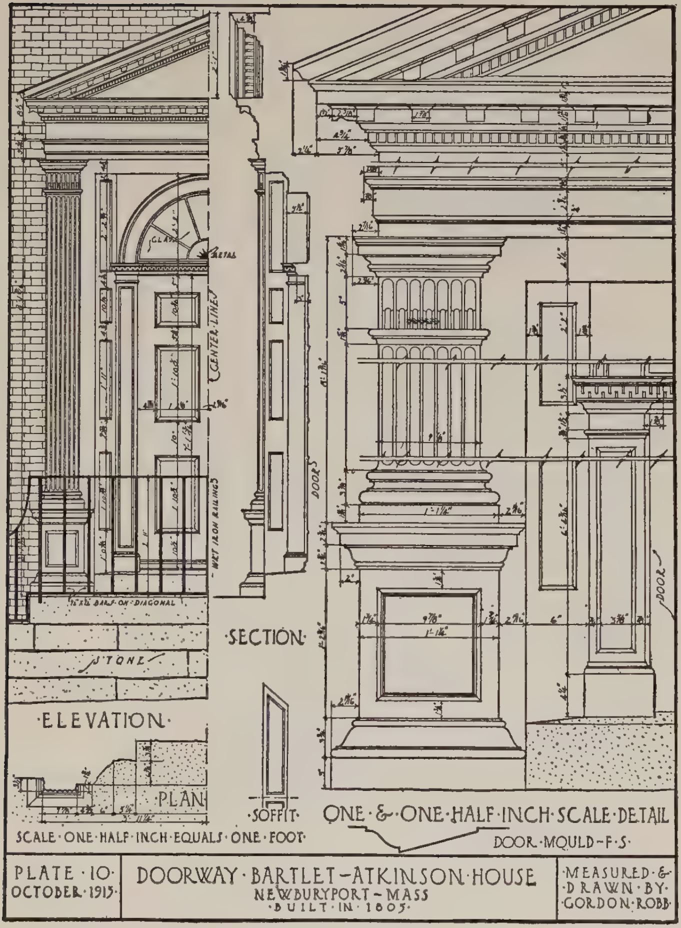

GLASS
METAL
CENTER LINES
WRT IRON RAILINGS
DOOR
¾" SQ. BARS ON DIAGONAL
STONE
·SECTION·
·ELEVATION·
PLAN
·SOFFIT·
ONE·&·ONE·HALF·INCH·SCALE·DETAIL
SCALE·ONE·HALF·INCH·EQUALS·ONE·FOOT·
DOOR·MOULD–F·S·
PLATE·10·
OCTOBER·1915·
DOORWAY·BARTLET–ATKINSON·HOUSE
NEWBURYPORT–MASS
·BUILT·IN·1805·
·MEASURED·&·
·DRAWN·BY·
·GORDON·ROBB·

Figure 22

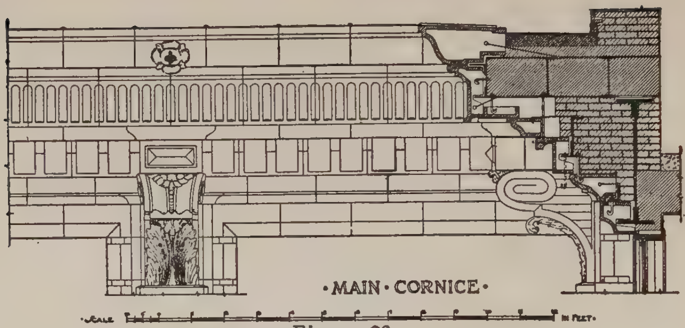


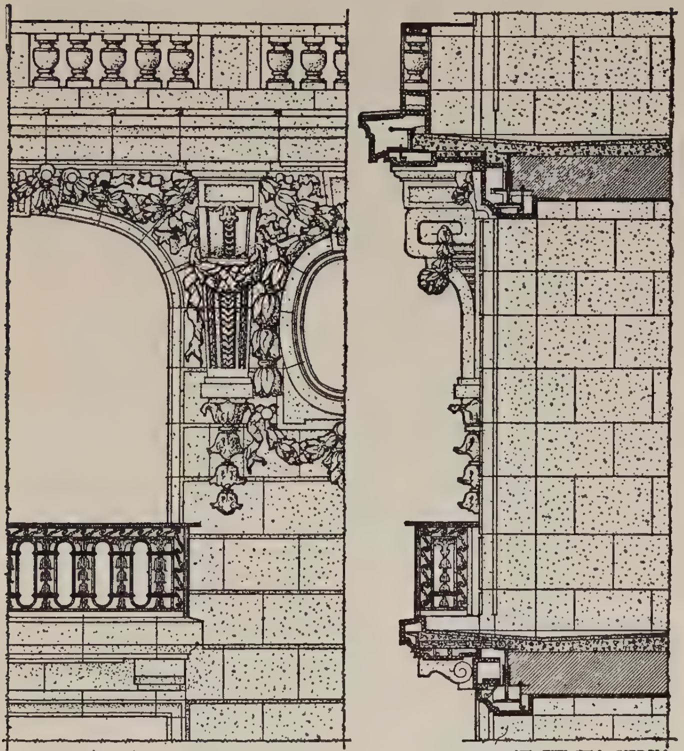
Figure 23

by the builder. Figures 23 and 24 show typical scale details, as made in architects' offices.

Figure 23 shows a portion of a cornice made of terra cotta. The left hand portion of the drawing shows the cornice in direct elevation, including one of the brackets. To the right of the drawing a section through the cornice is drawn, showing not only the profile, including a profile view of one of the brackets, but each piece of terra cotta as it would be cast to form the cornice, and also the "anchors" that fasten the terra cotta into the brick wall, and the structural steel.

Figure 24 shows a scale detail of a portion of a building, also faced with terra cotta, and illustrates a high standard of professional architectural draughtsmanship. Here, also, a bracket is shown in elevation and profile, with sections through a balcony.

The architect who wishes his work to be executed exactly as he intends it to be executed makes a great many scale details and full-size details, because from these drawings the artisans working for the building



· DETAIL · AT · TENTH · STORY · · SECTION · AT · TENTH · STORY ·

Figure 24

contractor are able to see all the fine points of the design.

It is not possible to show detail very clearly on drawings as small as the ¼ inch scale "working drawings," and these are made mostly to show the general dimensions throughout the building. Wherever elaborate construction detail, or ornamental detail occurs on the ¼

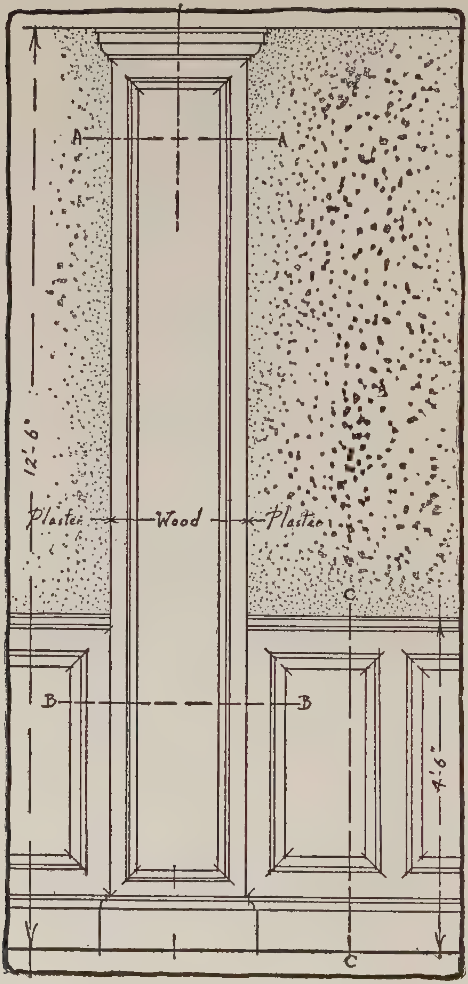


Figure 25

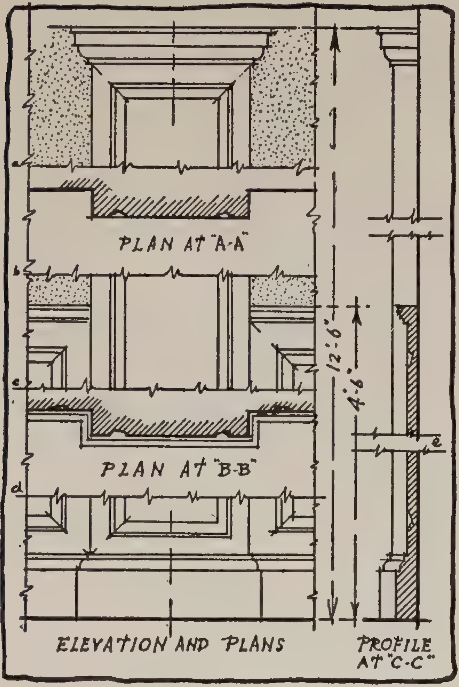


Figure 26

inch scale drawings, there are references to separate detail drawings. Thus it is usual to see such notes as "For mantel see 1½" scale detail," or, where some carving or panelling is shown, "See F-S-D," meaning "See full-size detail." All the drawings for a building are numbered, so it is a simple matter for the building contractor to refer to any drawing he may need to consult.

Even clearer and more definite are full-size detail drawings, in which portions of the work are drawn at their actual size, so that the builder can have before him the actual profiles of mouldings, for instance.

Fig. 25 shows a pilaster (see "100 Architectural Terms Illustrated"). Let us suppose it is intended to be 12 feet, 6 inches high, with a 4 foot, 6 inch panelled wainscot. It is not necessary for the draughtsman to show it at its full height, which would mean making a drawing actually 12 feet 6 inches high. The full-size detail is condensed by "breaking" the drawing, as shown by a, b, c, d, e (Fig. 26), so that the drawing, made as full-size details are usually made, shows the capital of the pilaster and its plan, cut through at "AA." The base of both pilaster and wainscot, all at full size, are shown cut through at "BB." To complete this detail, a profile of the pilaster is shown at the right of the drawing, with similar "breaks" as were made to condense the front view.

This is a very simple example of a full-size detail, but serves to illustrate the way in which this kind of architectural drawing is made. You can see that when the draughtsman has drawn the profile of a moulding, as for the head of the pilaster, it is important that the profile be the same throughout the drawing. After he has drawn it once, the draughtsman makes a tracing of it, blackens the reverse side with a soft pencil and transfers the profile to whatever part of the drawing it is required. This is typical of the many methods used by draughtsmen for ease and exactness in making drawings.

CHAPTER 5

SKETCHING—A SIMPLE FORM OF PERSPECTIVE—SCALE MODELS AND HOW TO MAKE THEM

It has been mentioned before that sketching is a very valuable accomplishment for the draughtsman or architect, and it is an excellent thing for any draughtsman to do as much sketching as possible in his spare time, in order to become proficient.

Not only does sketching train the eye to recognize proportions, but it is very valuable as a means of recording things seen, or ideas for architectural design. And sketching will make it easier to make the perspective drawings that are shown to the client before the scale working drawings are made.

There are scientific methods for laying out perspectives with absolute accuracy, and these methods are part of every draughtsman's training. It would be impossible, in this book, to take up perspective drawing as a study, and no more will be attempted here than to show a simple method of making a sketch perspective without the use of the scientific method.

Suppose the draughtsman wished to show a design for a house. He selects an illustration from any one of the popular home-building magazines, an illustra-

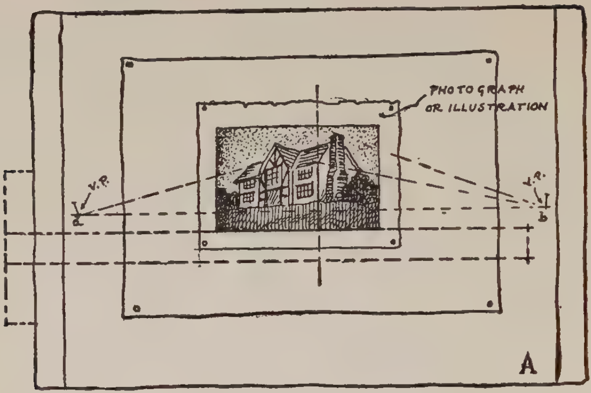


Figure 27A

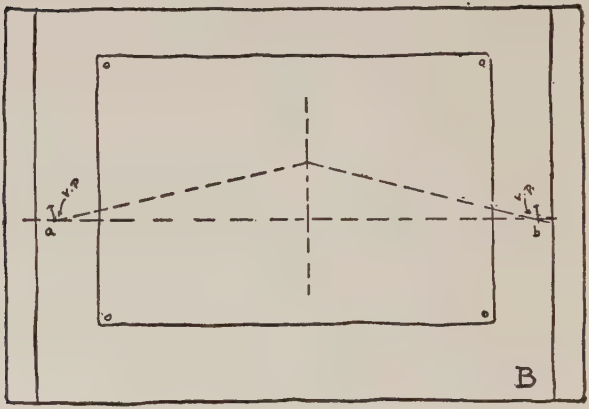


Figure 27B

tion showing a house from the same point of view that he wishes to show his house. He places the illustration on his drawing board and levels it up with his T-square. (Fig. 27A). Then he extends the roof lines and base lines as seen in the illustration until they meet in

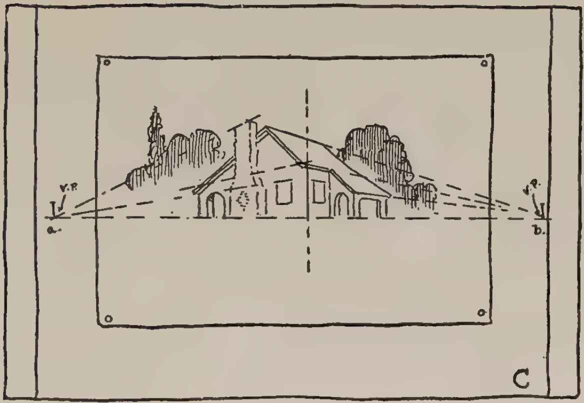


Figure 27C

points *a* and *b*. Points *a* and *b* are then marked by sticking pins in the drawing board. Removing the illustration from the board (Fig. 27B), the draughtsman has the points *a* and *b* to which to draw the roof and base lines of his own house. He usually indicates the windows and other main features, drawing quite lightly, and using the points *a* and *b* as shown in Fig 27C. (These points *a* and *b* are called "vanishing points," and are marked "V. P." in the diagrams in Figs. 27A, B and C.)

He can then finish up the drawing with soft pencil, or with pen and ink in an attractive sketch style, adding trees and other elements to give it pictorial interest, getting a result such as the English architectural rendering seen in Fig. 28. Fig. 29 shows an English draughtsman's style of sketch details and sketch perspective—a kind of presentation that any draughtsman will do well to study.

This group of drawings for an English "Lych gate," built of oak, received "honorable mention" in a competition conducted by the English art magazine, "The Studio," and is typical of much excellent work of this type done in England and published by that magazine. You will notice that in addition to a perspective sketch of the gate in its relation to the church, the draughtsman has also shown its construction in a close-up perspective as well as in cross-section and front elevation. The gate itself revolves on its center post, like a turnstile, which is also shown in sketch details.

Figure 30 shows a sketch perspective (also from a "Studio" competition) which is excellent in its rendering of construction and materials. All architectural sketches, whether they are made as records or notes of old buildings or as presentations of original designs should show how that portion of the building is put together, in other words its *construction,* and also should indicate the nature of the materials used.

Figure 31 illustrates another attractive method of showing an architectural design, by means of "sketch elevations," a method often used by English architects.

Perspective sketches are finished, or "rendered," as architectural draughtsman call it, in pencil, pen or pencil and water color, and with the skill acquired by practice, may be made highly attractive.

Another method used by architects to show the client their idea for his house is to make a scale model. In many ways this is the ideal method, for the house may be studied and seen from every side, and may be seen

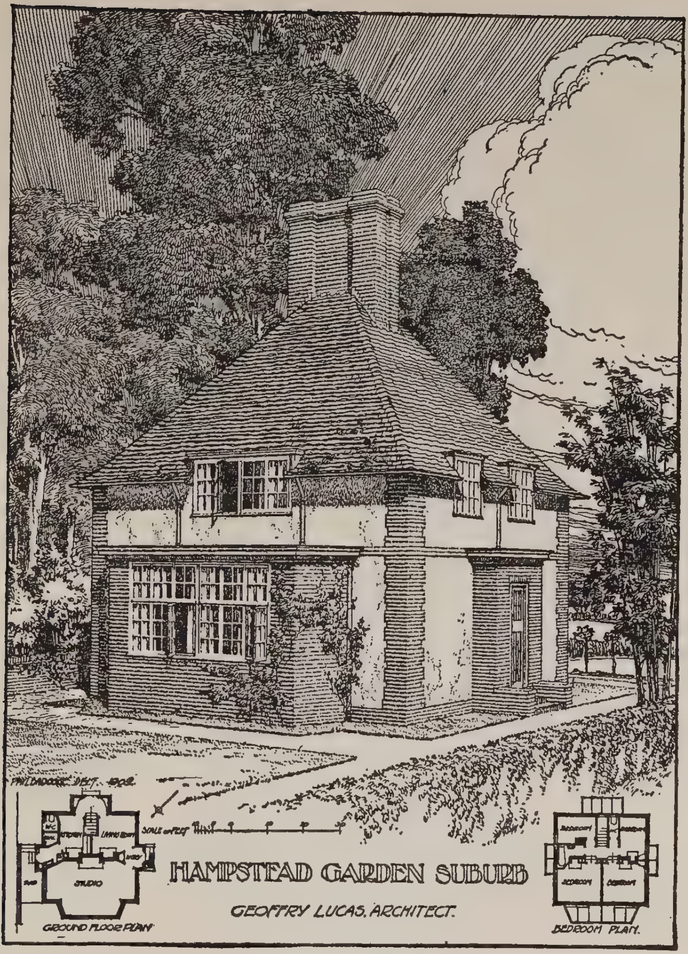

W.C.
KITCHEN
LIVING ROOM
SCALE OF FEET
STUDIO
GROUND FLOOR PLAN
HAMPSTEAD GARDEN SUBURB
GEOFFRY LUCAS. ARCHITECT.
BEDROOM
BEDROOM
BEDROOM
BEDROOM
BEDROOM PLAN.

Figure 28

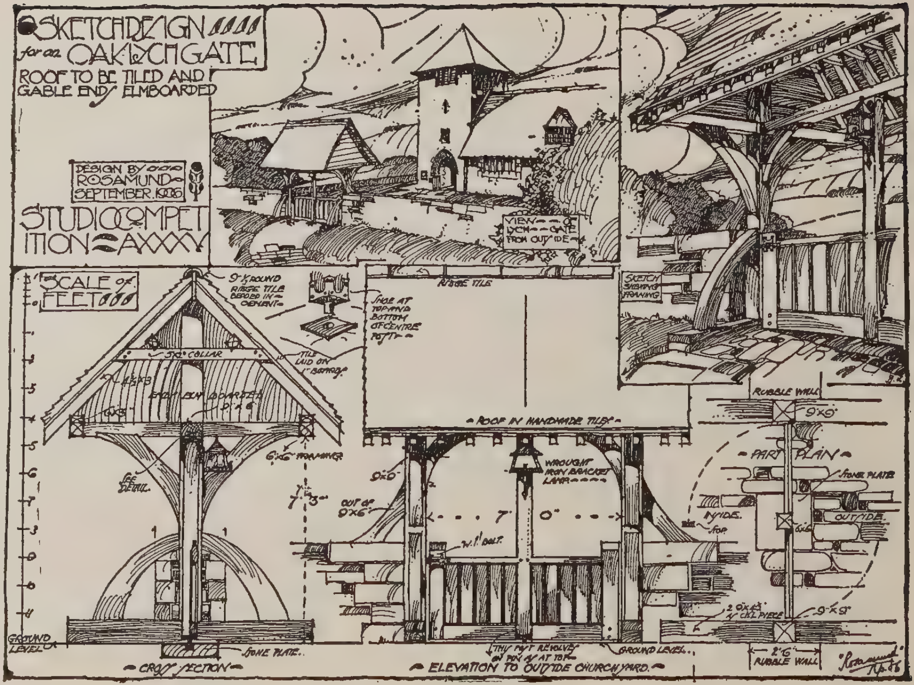

SKETCH DESIGN
for an OAK LYCH GATE
ROOF TO BE TILED AND GABLE ENDS ELMBOARDED
DESIGN BY ROSAMUND SEPTEMBER 1926
STUDIO COMPETITION AXXXV
VIEW OF LYCH-GATE FROM OUTSIDE
SKETCH SHOWING FRAMING
SCALE of FEET
9" ½ ROUND RIDGE TILE BEDDED IN CEMENT
5x2 COLLAR
4½x3
6x3
ELM BOARDED
9x6
TILE LAID ON 1" BATTENS
6x6 FRAMING
SEE DETAIL
7' 3"
OUT OF 9x6
GROUND LEVEL
STONE PLATE.
CROSS SECTION
SHOE AT TOP AND BOTTOM OF CENTRE POSTS
RIDGE TILE
ROOF IN HANDMADE TILES
9x9
WROUGHT IRON BRACKET LAMP
7' 0"
W.I. BOLT.
THIS PART REVOLVES ON PIN AS AT TOP
GROUND LEVEL.
ELEVATION TO OUTSIDE CHURCHYARD.
RUBBLE WALL
9x9
PART PLAN
STONE PLATE
INSIDE.
OUTSIDE.
6x6
2 9x4½ SILL PIECE
9x9
2'6"
RUBBLE WALL
"Rosamund"

Figure 29

in its relation to the site on which it is to be placed.

First the site is modelled in clay, with whatever terraces or grades the architect may plan, and showing driveways, walks and garden treatments. All this is done, like an architectural drawing, at a scale, usually ¼ inch to a foot.

The four sides of the house are then drawn, at the same scale, on heavy Bristol Board, with tabs for glueing. The drawings are carefully colored to resemble the color and texture of the materials to be used. Shadows are painted in, and the whole made to look as much as possible, in miniature, as the house itself is to look. The four sides are then cut out and reinforced with heavier cardboard, glued and braced inside, and erected on the miniature clay-modelled site. A roof is put on, chimneys added, and every other detail that will add to the realism of the whole.

Real glass is used in the windows of well-made models, with the divisions of the panes made by ruling lines on the glass. These lines are ruled with ink to indicate windows of leaded glass, and with white to indicate divisions of the sash in a white-painted house. Shutters are made separately of bits of heavy cardboard, painted the required color, ruled with panels or slats and glued on.

To indicate rough stone masonry, one of the hard-drying modelling clays is usually used and the forms of the stones modelled on a wooden model of the house. When the clay has hardened, the artificer colors each "stone" and paints in the mortar joints, giving the

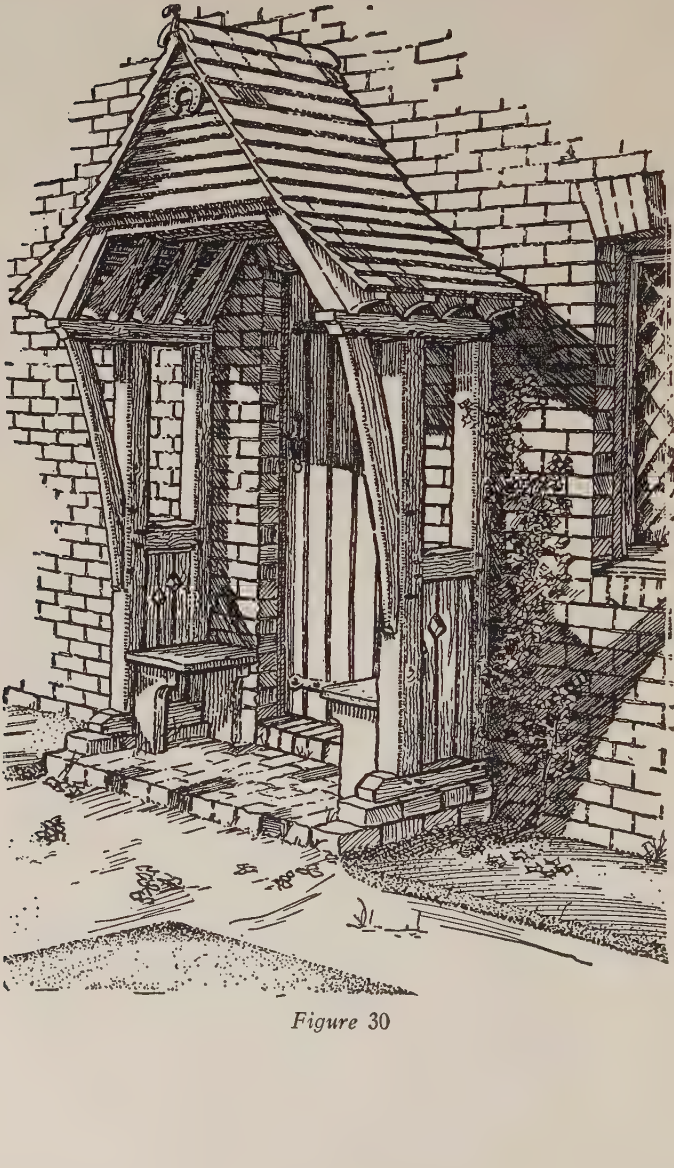


Figure 30

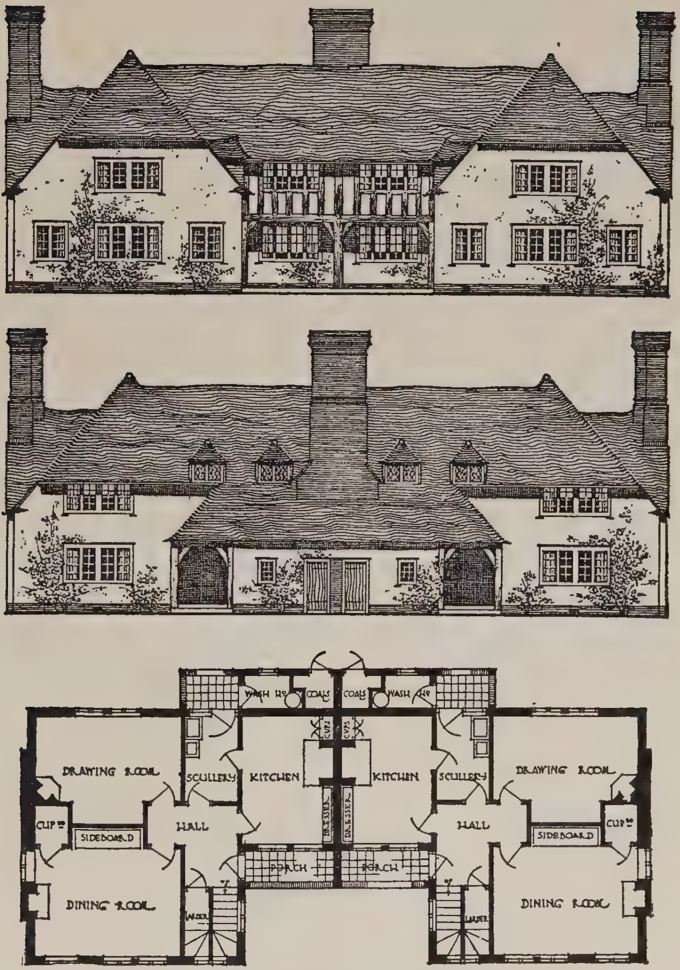

WASH HO
COALS
COALS
WASH HO
CUPS
CUPS
DRAWING ROOM
SCULLERY
KITCHEN
KITCHEN
SCULLERY
DRAWING ROOM
CUPD
SIDEBOARD
HALL
DRESSER
DRESSER
HALL
SIDEBOARD
CUPD
PORCH
PORCH
DINING ROOM
LARDER
LARDER
DINING ROOM

Figure 31

whole a remarkable effect of reality, if the masonry has been kept properly in scale.

If the house happens to be of Spanish or Italian type, with mission tile roof, the roof would be made of ordinary corrugated packing board, painted brick red and marked off in tiles. The walls would be covered with shellac and sanded, while the shellac is still sticky, and when dry would be tinted to any color desired. Rough sand-paper, tinted, is sometimes used for "stucco" walls in model-making. A heavy slate roof would be made of small pieces of cardboard, cut out irregularly, painted in a range of slate colors, and glued in place on the roof.

With liberal use of glue, paint, varnish and ingenuity, any one with an understanding of architectural scale can make a house model, discovering endless ways of "faking" different building materials and textures as the work proceeds.

Trees and shrubs in architectural models are usually made of different kinds of sponges, cut to the desired shapes and dyed green. Grass for lawns may be green felt or, for greater realism, green plush.

Some architectural scale models are so cleverly made, and so admirably kept in scale that when they are photographed you might well believe you were looking at a photograph of an actual building, as in the two views of the scale model of a Country Club, shown in Fig. VIII.

The making of scale models of large public buildings is no job for an amateur, and is done by professional modellers. Such models often cost thousands of dollars.

Another use of modelling made by architects is found in the detailing of architectural ornament. In addition to full-sized detail drawings, architects usually have full-size models made showing carving or any special ornamental treatment which they wish to have executed to correspond exactly with their idea of how it should be done. The architect himself seldom makes these models, but has them made by a professional modeller, subject to his approval.

CHAPTER 6

ARCHITECTURE AS A PROFESSION—FROM DRAUGHTSMAN TO ARCHITECT—WHAT THE ARCHITECT SHOULD KNOW—SPECIALIZING

No other profession combines art, science and business as the profession of architecture does, and few professions hold so much interest or variety for those who practice them.

Architecture is not an easy profession, but it is one that holds great satisfaction. The architect first sees his work in his mind's eye. Then he puts it on paper. Then he sees his vision grow into reality, sees it taking actual form in wood, stone, brick and mortar. Then there is the finished building, standing where all can see it—a permanent accomplishment.

And the profession of architecture, from its nature, makes the architect a man of authority. All the work must be done subject to his approval. He selects materials and passes on the way in which they are to be used, as well as on details of construction.

Architecture as a profession, certainly, cannot fail to stimulate the imagination of any young man who is thinking of going into it, and if he could know in advance all that it means to be an architect he would feel that no part of the necessary training was too great an effort.

The step from draughtsman to architect is seldom an easy one, and is accomplished in several different ways. In a small firm a draughtsman may be taken into partnership if his work is sufficiently brilliant or valuable to warrant it. He is more likely to be taken in if he can bring with him a "job"—if through social connections he can develop a client. With money, he may buy himself into partnership, if he has also ability.

In large offices, or in any office where the draughtsman has reason to believe that he is unlikely to be asked in as a partner, he may do a piece of work in his spare time, working at night and on holidays, if through some personal means he can get a house or any other building to design.

Sometimes, if two fellow draughtsmen, between them, can get work of their own to do, they give up their positions as draughtsmen and set themselves up as architects. If they have no capital they must count on every possible economy in doing business. They must find a small and very inexpensive office, two draughting tables, perhaps bought second-hand, and they must be willing to be their own office boys and do everything they can to keep down expenses at first. And while they are working on their first "job" they must do all they can to find another to follow on with. Often two draughtsmen, sometimes one plucky fellow alone, make the jump from draughtsman to architect in just this way.

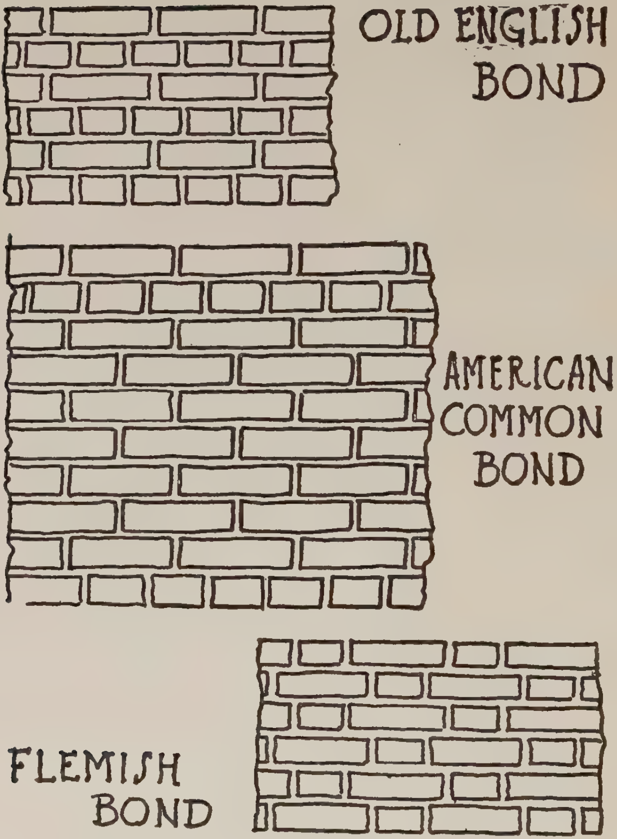


Figure 32

It is easier, of course, if at least one of them has a little money to start with—but sometimes it is too easy, and they do not work hard enough to succeed, not nearly so hard as the fellows who have to make their first few jobs as architects pay for the cost of doing business, and for their living as well.

What should an architect know?

One answer might be that he should know everything he possibly can. In considering his work, as a student, some idea was given of his earlier training, including a good, clear knowledge of the evolution of architectural styles, and the characteristics of the styles. Also proficiency in drawing, sketching and making architectural drawings. He must know a great deal about construction and about all kinds of building materials.

He should know the technique of stone masonry and bricklaying, including the various kinds of mortar joints and the different methods of laying brick. These methods are known as "bonds," and several of them are shown in Figure 32. Six kinds of joints commonly used in brickwork are shown in Figure 33, and in specifying brickwork the architect must know about mortar mixtures and the various ways of mixing and coloring mortar.

He should also be familiar with the principles of timber framing (which are taught in architectural schools) and with the more craftsmanlike are of finished woodwork, both inside and outside the building.

He should develop a keen appreciation for all the

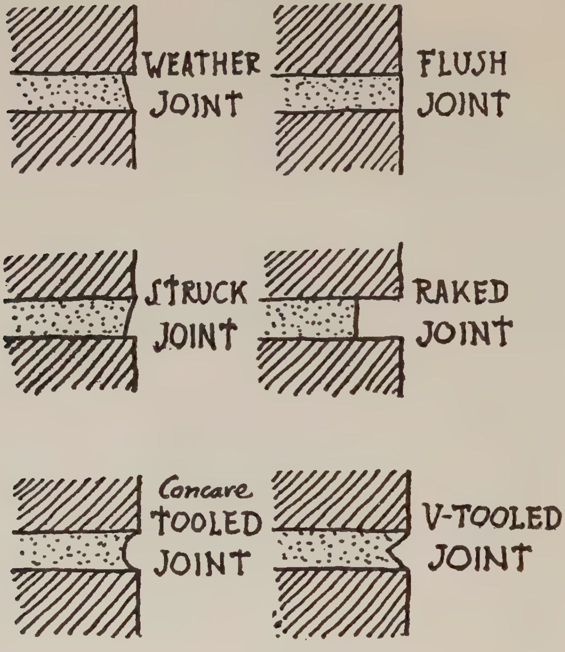


Figure 33

arts connected with building such as sculpture, carving, metalwork, glass, tiling, finishing and painting woodwork: at any time he may wish to include these things in his work, and will be called upon to supervise and finally approve the finished result.

Assuming that the architect is familiar with the older, more standardized materials, he should keep himself constantly informed on the new materials which are perfected every year—new floorings, new roofings, new stucco finishes, and all manner of things for building equipment and construction that are constantly appearing. The manufacturers of these products naturally do all they can to introduce them to the architect, but in addition to following the advertising magazines, the architect should always examine the actual product and learn as much about it as he can.

Large modern buildings involve so much highly specialized work that it is interesting to devote a few minutes to a study of the general method by which such work is done by sub-contractors under the architect's direction.

First the architect will have submitted preliminary drawings, perhaps in competition with other architects. These drawings consist of all the plans, drawn to scale, (but without all the notes and measurements that are put on scale working drawings) all the elevations, usually "rendered" in color, and one or more perspective drawings, also rendered in color. These drawings, in memory of the old Beaux Arts School in Paris are still called *projet* drawings by most architects, meaning drawings for a "project."

Supposing the preliminaries have been approved and accepted, the architect then receives a portion of his fee and commences work on the working drawings. He first makes the ¼ inch scale drawings, then as many scale details and full-size details as may be required. But as soon as the ¼ inch scale drawings have been made, and the specifications written, the architect calls in the various special sub-contractors and furnishes each with a set of blue-prints so that these special sub-contractors can estimate costs, make bids and lay out separate plans, as, for instance, plans showing electric wiring, plumbing, heating and ventilating. On large buildings requiring structural steel, engineers who are specialists on steel construction usually make complete sets of drawings showing every piece of steel to be used. Special sets of drawings are made by various manufacturers of building products, but all such drawings are worked out from the architects' working drawings for the building, and are in every way made subject to his approval.

Certain other drawings are made after a building is partly built. These are drawings for finished work which is installed after the structural part of the building is in place. As an example, the New York Public Library, with its heavy brick walls faced with blocks of white marble, and its steel-beamed floors filled in with concrete was, at this stage of its building ready for the finished work. The designs for all the elaborate modelled plaster ceilings, the wood-work, the decorative marble work, the bronze window frames and other such work had been made by the architects, and were then placed in the hands of different groups of draughtsmen, each group under a head draughtsman, representing the sub-contractors who were to actually make and install these several things. A temporary draughting room was set up in the building, and each group of draughtsmen proceeded to take measurements of every room and corridor, and to

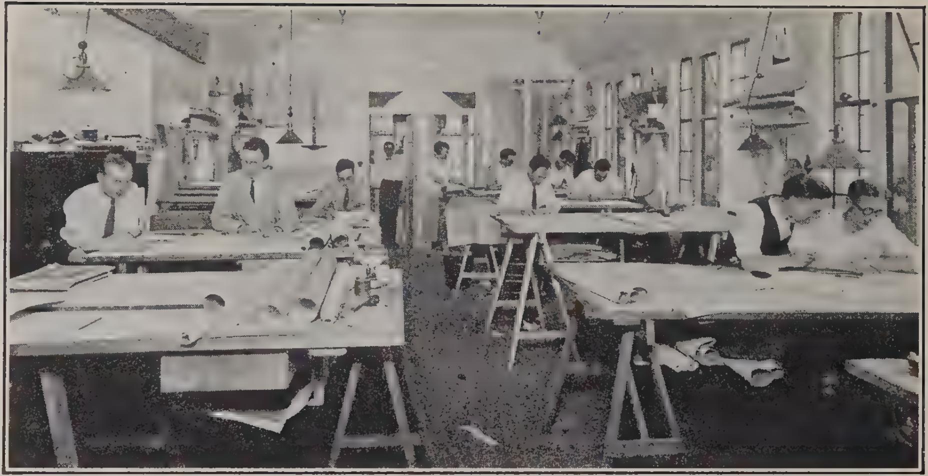


Fig. I. A typical scene in an Architectural Draughting Room

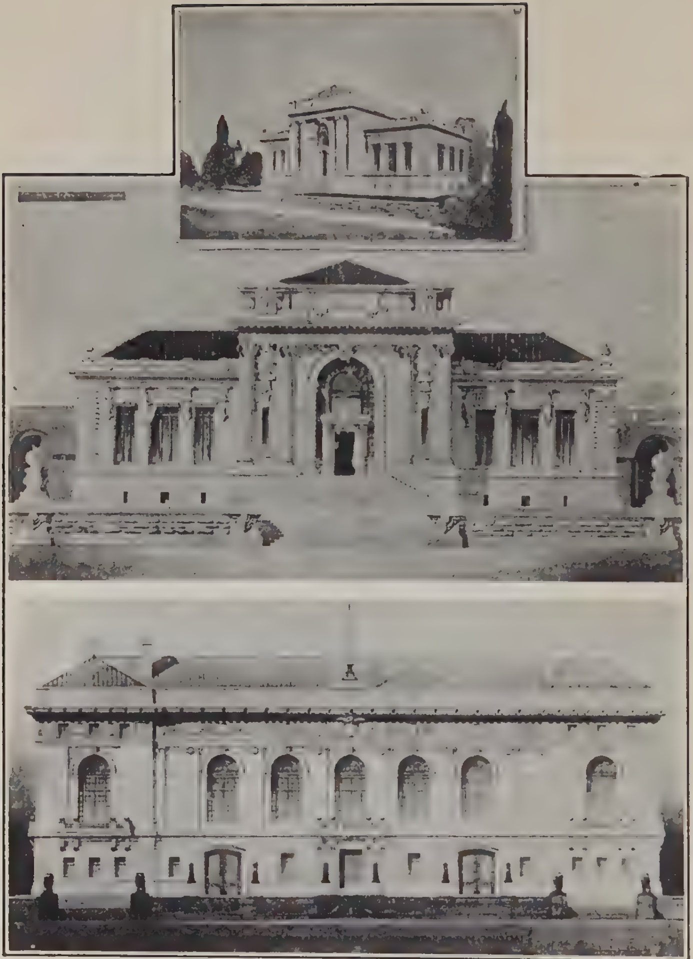


Fig. II. Typical student projet *drawings*

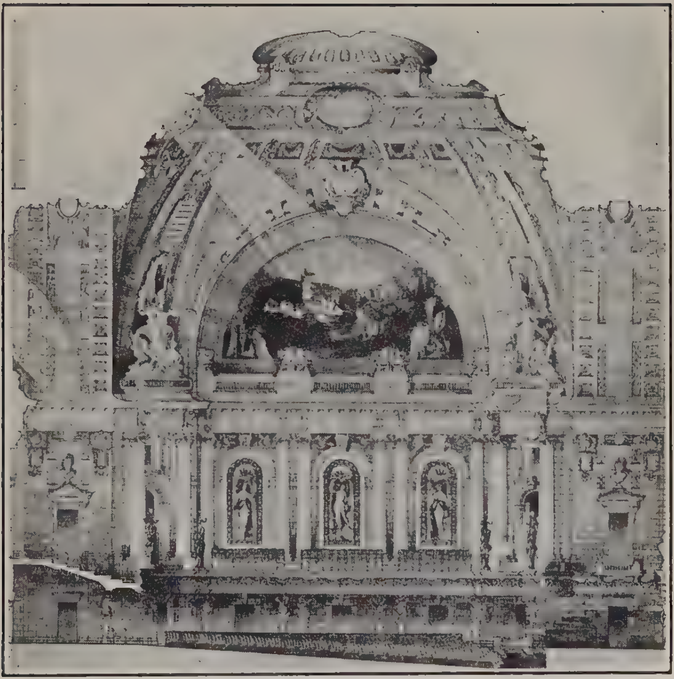
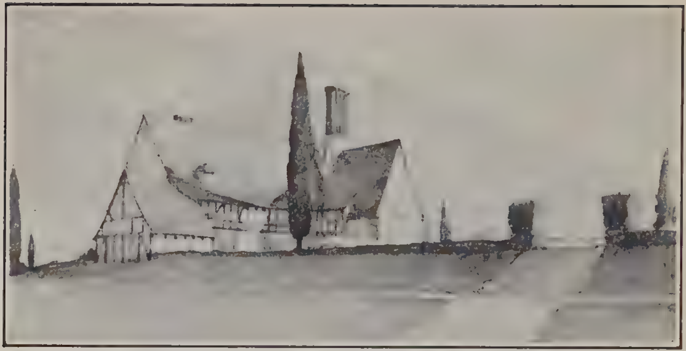


Fig. III. A student projet *drawing showing a section through a theatre, designed and drawn in the manner of the great French Ecole des Beaux Arts.*



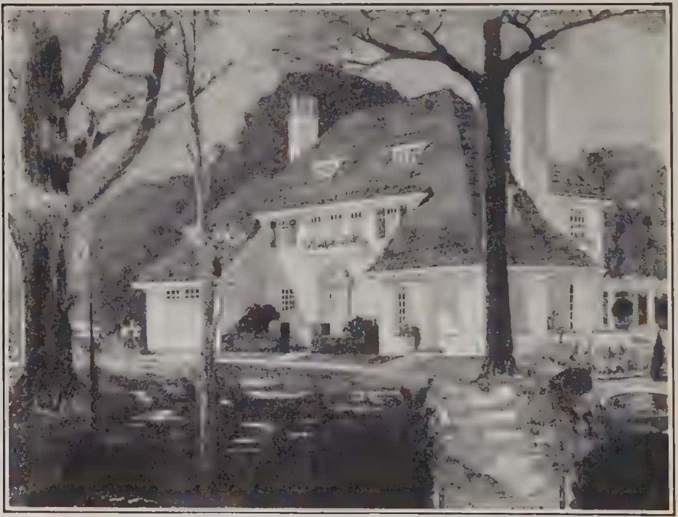


Fig. IV. Reproductions of architects' preliminary drawings in color.

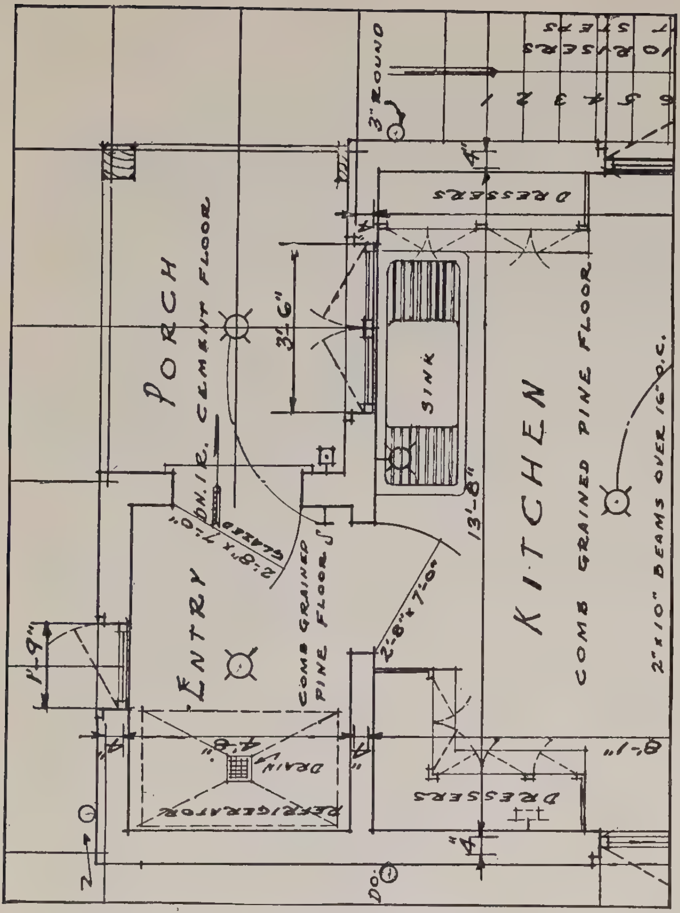


Fig. V. Portion of a ¼-inch scale house plan, reproduced at actual size from an architect's drawing

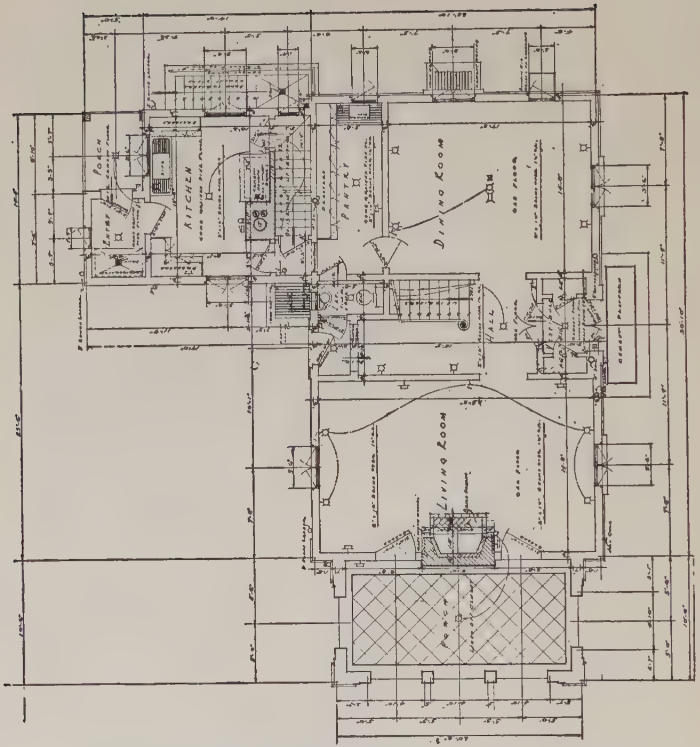


Fig. VI. Architect's ¼-inch scale plan of a small house, with complete notes and dimensions. A portion of this plan at actual size, showing kitchen and entry, may be studied in Figure V.

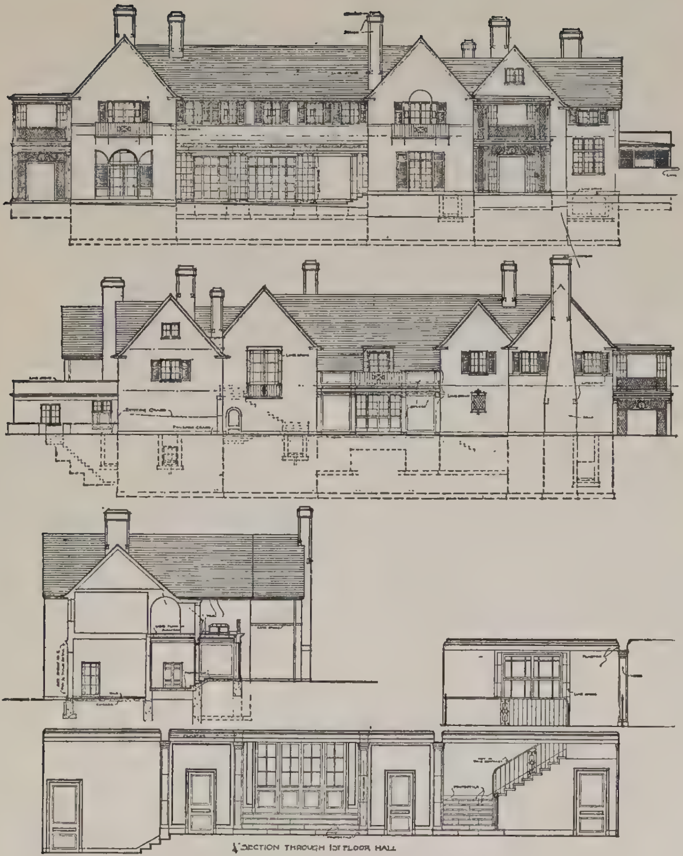


Fig. VII. Architect's ¼-inch scale elevations and sections of a country house. Usually more notes and dimensions appear on elevations.

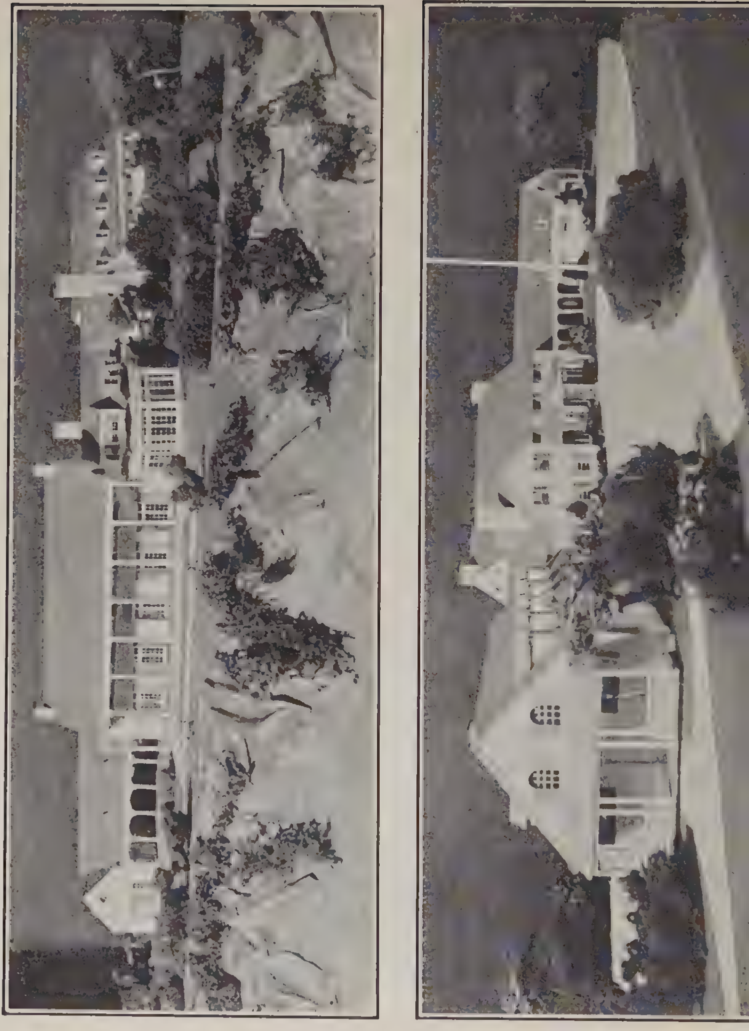


Fig VIII. Scale models of a Country Club

make drawings showing how all the finished work was to be made.

The measurements were necessary in order to have all the decorative marble, woodwork and other finished materials exactly fit the various places for which they were designed. Suppose, for instance, that a room had a floor with a border of marble, marble bases and door-frames, carved oak doors, wood panelling, elaborate bronze windows and an ornamental plaster ceiling. Several of the draughtsmen made an absolutely accurate set of measurements of the room including the exact heights and widths of doors and windows. The plan of the room was drawn to scale from these measurements, and scale elevations were made of each of the four walls.

The draughtsmen representing the marble workers then drew in each piece of marble, to scale, and turned the drawing over to the woodworker's draughtsmen, who drew in all the panelling and the doors. The draughtsmen for bronze then drew in the window frames, and the plasterers draughtsmen drew in the plaster ceiling in profile on the elevations, and in a flat plan, showing the complete design. In a temporary modelling room, also in the unfinished building, expert modellers made full-size models of all the ornamental work, whether it was to be executed in marble, wood, bronze or plaster, these models being made subject to the approval of the architect.

In addition to their scale drawings, the draughtsmen representing the marble, wood, plaster and bronze workers made full-size details (F.S.D.) of every portion of their work which would be required in their various factories to execute the work. In ancient times, for instance when the great cathedrals were being built, all the work was done on the spot, and the stone-cutters could measure the place in which the next stone was to be placed, and cut it accordingly. The condition to-day is different, and as virtually all the work has to be done at considerable distances from the buildings, complete and accurate drawings must be made.

While all this work on the part of the various special sub-contractors saves the architect much trouble and responsibility, he is still responsible for the entire building and everything that is done on it, and he must thoroughly understand everything that the various sub-contractors are doing, and be able to "read" their drawings and make such criticism as may be necessary.

The architect's work, in short, besides being the master-designer of the entire building and all its details, is to know everything about it, which, as can readily be imagined, requires a strong combination of training and experience.

In order to write specifications the architect must know about materials and about the methods and artisanship of building, and he must know enough about the business of conducting an architectural practice to be able to figure costs and profits. An architect's payment is a percentage of the total cost of the building he is engaged to design, plan and supervise, so the size and cost of the building determine his fee.

Apart from the architect's technical or professional training, he should have good taste, and with a good education and social connections he will get on much faster than without them. In dealing with his clients the architect must have a great deal of tact and patience. He must be able to please the client without retreating too far from his own beliefs as to what is or is not good architecture. He must be a good diplomat, and must be able to deal even with the most unreasonable clients.

So many are the requirements of a good architect that the profession is one in which many partnerships are found—alliances of two or three men each one of whom is differently qualified. One may be the artist-designer member of the firm, the second a business man and the third a man whose principal duty and ability is to secure new work for the firm to do.

Although interior decoration and garden design are separate professions, many architects have done very fine work in both these fields. The architect's training generally gives him more than a slight familiarity with these two allied professions, and some architects have gone even further into the field of special design, showing themselves to be excellent designers of furniture.

Most architects are known for their special ability in certain types of buildings. Some, for instance, are widely known for country house design, others for city buildings. Some specialize on certain types of buildings, such as banks, schools, hospitals, hotels or clubs. While this specialization often eliminates the firm from getting work outside the field of its specialty, it has the desirable effect of winning a good share of the work in the class covered by the specialty.

Now you have met the architect. You have, in fact, followed him from his student days through to the point where he sets up in business for himself as a practising architect, and definitely assumes the varied and interesting responsibilities of his profession.

CHAPTER 7

Working With the Architect

A LITTLE ABOUT GOOD SENSE, INTELLIGENCE AND FAIR PLAY. A FEW THINGS NOT TO DO. ARCHITECTURAL STUDY FOR NON-ARCHITECTURAL DESIGNERS.

The first six chapters of this book were written, to a large extent, for the information of young men who might be thinking of becoming architects, and for older people who might be thinking of architecture as a career for some young man in whom they are interested. The career, as a matter of fact, need not be confined strictly to the young man, though women have attained more conspicuous success as interior decorators and landscape designers than as architects.

The conclusion of the Sixth Chapter leaves the architect in charge of his profession, and suggests that the present chapter be addressed to all and any who may have occasion to engage the architect in a building project. It is addressed, however, primarily to those about to build a country house of small or moderate size, for it is in this branch of the architect's work that his greatest difficulties arise. And most of these difficulties are due to the fact that a great many people are not at all familiar with the way the architect works, and consequently do things that are neither fair nor wise, and that are surprisingly unbusinesslike.

It is not fair, for instance, to engage an architect to make preliminary drawings for a house, and at the same time to similarly engage one or more other architects, without letting each know that others are competing. Very few architects, in fact, would agree to make preliminary sketches for a country house at all, if they knew others were competing. Architects prepare and submit drawings in definite competitions for important buildings, but in such competitions there is a uniform "program," or outline of the requirements, and each architect competing knows that none of the other competitors will have any special advantages, or that the award will be made by any but competent and thoroughly qualified judges.

It is a common occurence, too, for people to change their building plans, after having an architect make preliminaries, perhaps deciding not to build at all, or not until some indefinite future date. When this happens, they often behave as though they were surprised that they should be expected to pay the architect anything for his preliminary work, although the architect, obviously, is absolutely as much entitled to a part payment as though the work were going ahead. Another mistake often made, and one which is certainly unwise if it is not unfair, is the readiness with which people show the architect's designs for a house to their friends, coming back then to the architect with dozens of incompetent objections and things they want the architect to change. The architect will gladly undertake to please the people for whom he is directly designing the house, but he cannot (and usually will not) undertake to please all the friends of these people. Nor is it fair to expect him to.

Architecture is as much a profession as law or medicine, and people would not dream of getting unprofessional comments from their friends and taking these comments back to the lawyer or doctor whose services they had engaged, though they do exactly this with their architect.

The architect is a professional man, as sincere and conscientious in his work as any other professional, and his interests lie all in the direction of pleasing his client. He is not likely to build a second house for the client, but he knows that most of his business must come through that client's recommendation to others. And quite apart from pleasing his client, the architect knows that his best, (as well as his only) form of advertising is the merit of his work. His reputation is at stake, and it is only natural that he should advise his client against anything in a proposed house that would be bad architecture or bad practical planning. The architect's advice, in fact, is all in his client's best interests, and should be so received. No architect has anything to gain by quarelling with his client, and the client should realize that he has nothing to gain by quarrelling with his architect.

The relationship should be a thoroughly friendly one, as well as a business one, and where architect and client are in accord, the results are always far better than they can ever be when the client interferes with the architect's efforts to create a successful house.

Returning again to the preliminary drawings, it should be easy to see that any extensive changes the client may wish made should be made at this stage of the work and not later.

Not only is it more expensive to make changes on the scale working drawings later, but the first estimates on the cost of the proposed house are made on the preliminary drawings. People who add a number of things to their house after its cost has been estimated, are usually surprised when they find the cost has advanced above the original figure, and not infrequently they quite unreasonably blame the increase on the architect.

The architect does his best to keep the cost within the figure stipulated by his client, but he cannot control the costs of materials and labor, which have greatly increased within recent years, and which can be offset only by the most skilful and economical planning.

It is a common mistake of people not familiar with building to assume that building costs are the same throughout the country, or over a long period of time. This is far from being the case, and if the architect is given an illustration of a house clipped from a magazine, or a photograph of a house, perhaps in California, and is asked to build "something like" it on Long Island, or anywhere near New York, he can only estimate according to *local* costs and these vary widely in different states and different localities.

People should try to tell the architect all their special requirements, all their likes and dislikes, at the very beginning, so that he will be able to design for them a house that will be as nearly as possible the house they want. Generally an architect will try to find out as much of this special information as he can by means of intelligent questioning, but there may be certain things he could not be expected to know unless he were told. It will be seen that even when the wrong kind of dealing with an architect is not actually unfair, it is at least unintelligent and does not in any way help in getting good results.

It is perfectly intelligent for the client to investigate all kinds of new materials or equipment he may wish to have included in his house, but he will do well to consult with his architect about such matters, as the architect's greater knowledge and experience may well save expensive mistakes. People so frequently forget that while they are engaged in building their first house, the architect has built a great many houses, and he knows from actual experience what materials are a good investment, and what methods of construction are essential to the long life of the house.

From its nature building is an investment, and economy of upkeep should be considered quite as much as initial cost. Poor materials and labor never make a house that is a good investment, and when the archi-

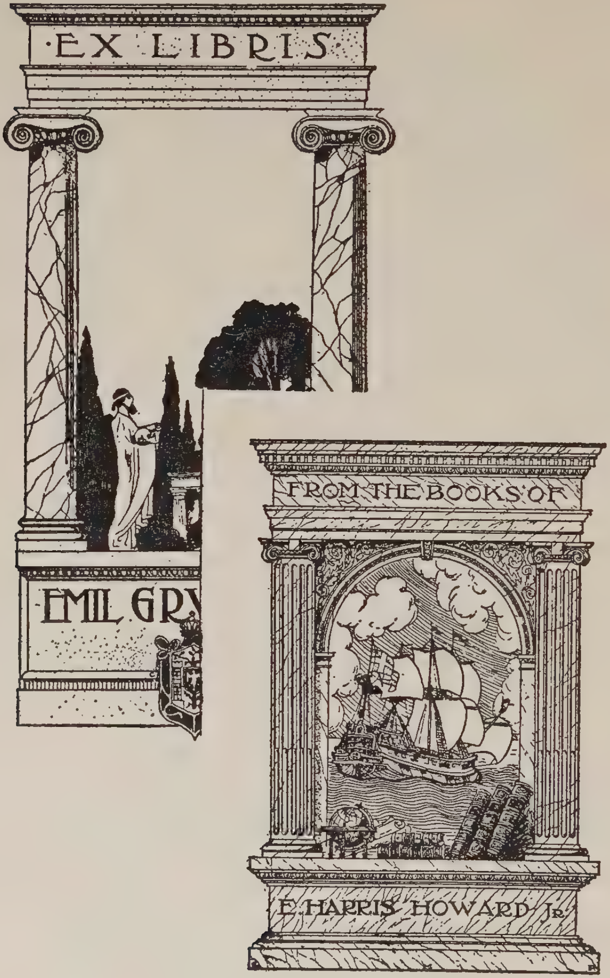


Figure 34

tect advises that the house should be as well built as possible, his advice is in the client's best interest. Since architects receive no commissions other than their percentage fee paid by the client, they have no gainful motives in making their recommendations, and the client should feel that he is simply receiving sound and valuable professional advice.

If people would keep in mind the professional nature of the architect's work, there is no good reason why the two should not get on in pleasant harmony. And the client should be the one to promote such harmony, rather than to destroy it, because the most successful houses have always been those on which architect and client worked together with friendly understanding.

As a conclusion to this chapter, though not directly related to its main head, I would like to include a few thoughts on the uses of elementary architectural study for persons who do not intend to follow architecture as a profession.

Most designers should know architecture. Certainly the artists who specialize in decorative work such as borders, bookplates and similar things should know architectural mouldings, architectural motifs and compositions, or they inevitably make serious mistakes and poor deigns. The use of architectural knowledge in design is seen in two bookplates (Figure 34). The basis of so much design is in architecture that all designers in the industrial arts should make a study of architectural essentials.

Certainly anyone intending to take up interior decoration as a career should make a very thorough study of architecture, including, if possible, a year in an architectural draughting room. A great many architects consider that interior decorators lack authoritative knowledge of their work, and this opinion is based on the fact that too many decorators have neglected to gain any practical knowledge of architecture.

Designers of stage and motion picture settings, too, should know as much as possible about architecture in order to make their work convincing and correct.

Sculptors and mural painters, whose work is necessarily a closely related part of architecture, should also make an extensive study of the subject.

Apart from such special and obvious uses of architecture as lie within the designer's field, architecture might well be considered as a part of a liberal education, as at one time, it was. It was believed, and rightly, that anyone's general culture and appreciation must be increased and stimulated by even a slight familiarity with the principal architectural styles, and with the general story of the evolution and sequence of architectural styles through history.

In a sense we all share all the architecture of the past and of our own time, and should all have a part, at least, in understanding it. More directly, it is always possible that one may be placed on a building committee, or a community betterment committee, and to be so placed, without any architectural knowledge is not only to lose an important opportunity for public service, but perhaps to be instrumental in the promotion of some architectural blunder.

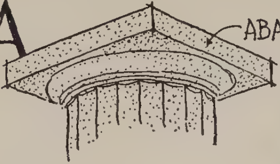
To go about, especially to travel, with vision that has been educated to see architecture, is to have a vastly increased capacity for enjoying life. Other forms of art have their place in the lives of those who wish to include them, but architecture is the art that is constantly around us, before us and behind us, whether we seek it or not. We will do well to include it in the range of our general knowledge and appreciation.

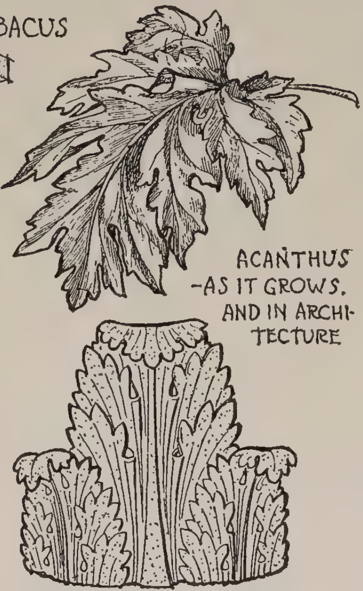
ONE HUNDRED ARCHITECTURAL TERMS ILLUSTRATED

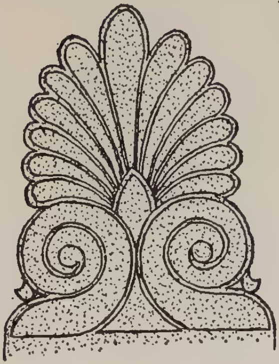
Like every special subject, architecture has its own vocabulary of terms and names. Of these some are more frequently encountered than others, and some are more generally an aid than others in reading or discussing architecture. The writer has endeavored to select one hundred terms of general use, and to define these terms by means of simple pen sketches. The reader will bear in mind that the following ten pages do not attempt to constitute a complete illustrated glossary of architectural terms. This would require a set of special volumes, and the present purpose is merely to provide a compact architectural vocabulary, graphically presented.

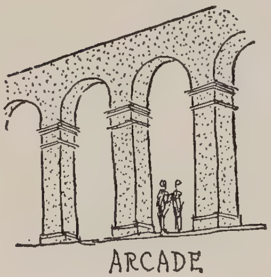
100 ARCHITECTURAL TERMS ILLUSTRATED

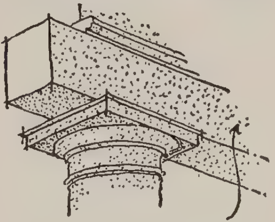
A

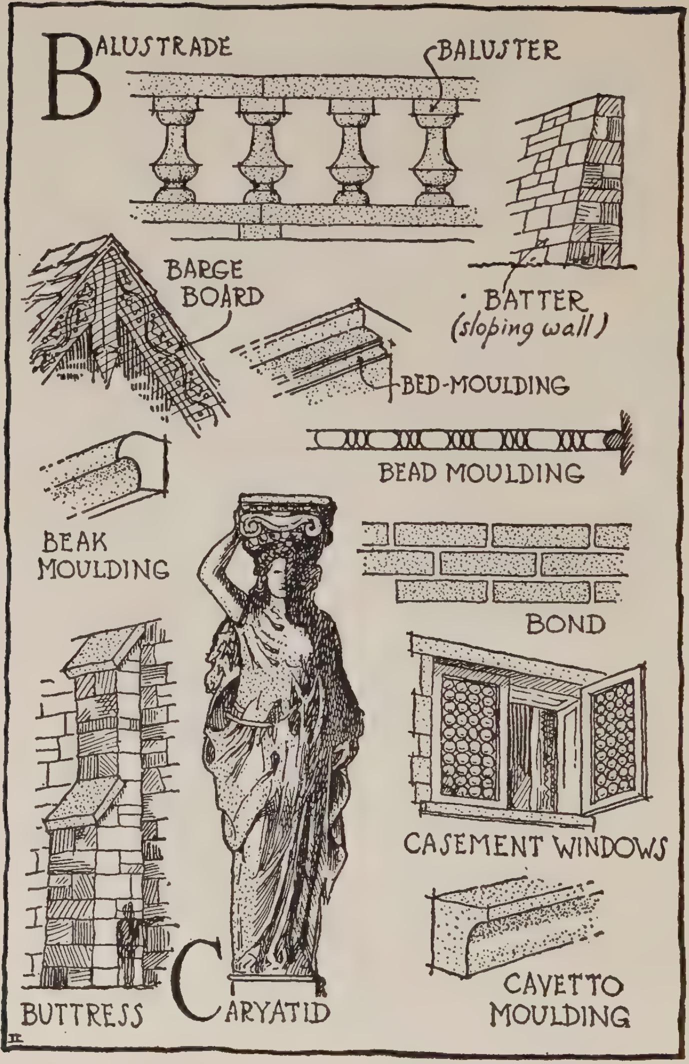

ABACUS

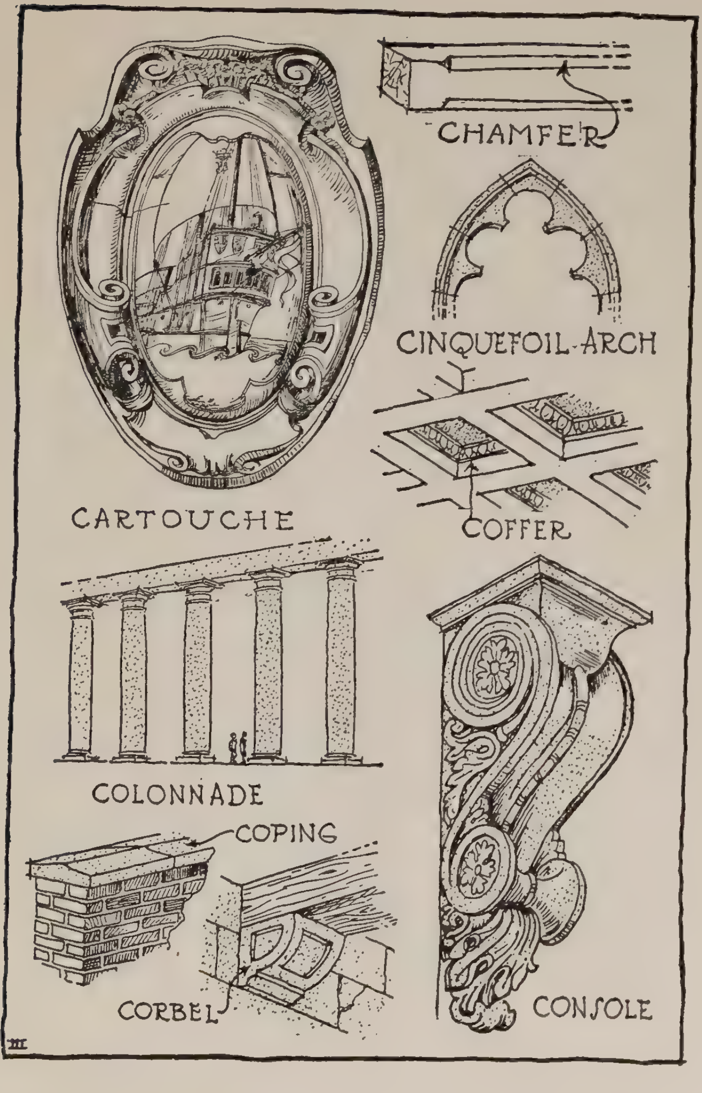

ACANTHUS -AS IT GROWS, AND IN ARCHITECTURE

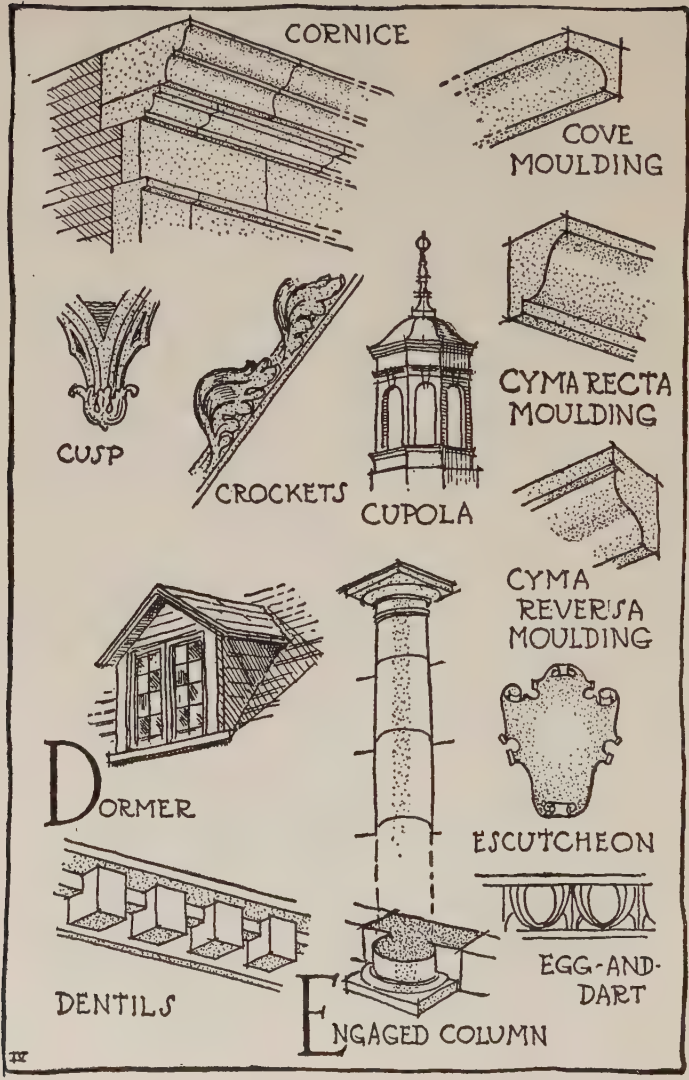

ANTHEMION

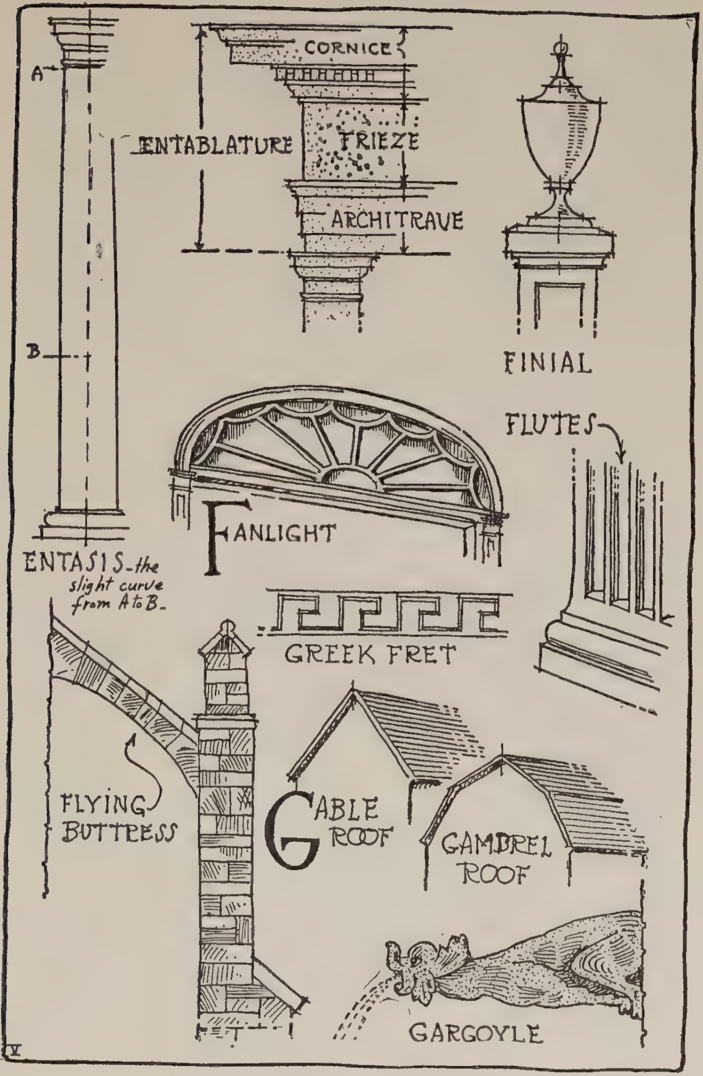

ARCADE


ARCHITRAVE

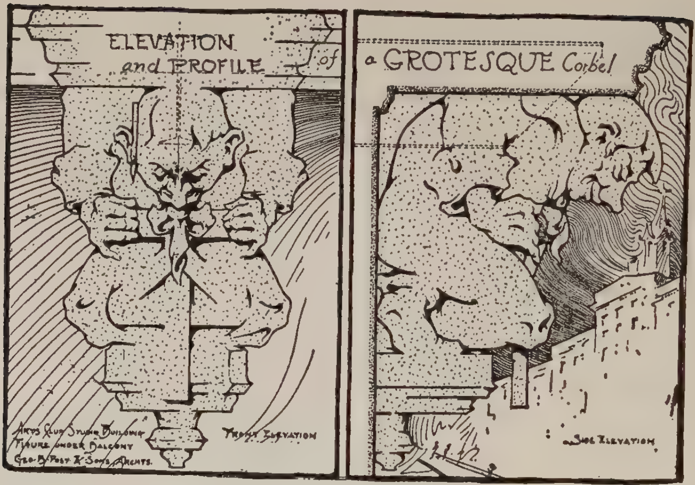

BALUSTRADE
BALUSTER
BARGE BOARD
BATTER (sloping wall)
BED-MOULDING
BEAD MOULDING
BEAK MOULDING
BOND
CASEMENT WINDOWS
BUTTRESS
CARYATID
CAVETTO MOULDING

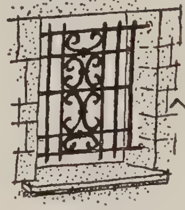

CHAMFER
CINQUEFOIL-ARCH
CARTOUCHE
COFFER
COLONNADE
COPING
CORBEL
CONSOLE
III

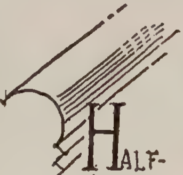

CORNICE
COVE MOULDING
CUSP
CROCKETS
CUPOLA
CYMA RECTA MOULDING
CYMA REVERSA MOULDING
DORMER
ESCUTCHEON
DENTILS
ENGAGED COLUMN
EGG-AND-DART

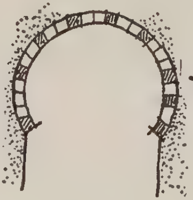

A
CORNICE
ENTABLATURE
FRIEZE
ARCHITRAVE
B
FINIAL
FLUTES
FANLIGHT
ENTASIS-the slight curve from A to B-
GREEK FRET
FLYING BUTTRESS
GABLE ROOF
GAMBREL ROOF
GARGOYLE
V

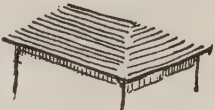
ELEVATION and PROFILE of a GROTESQUE Corbel

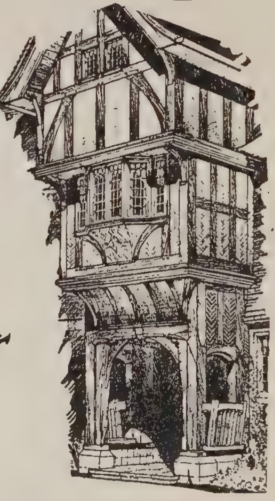


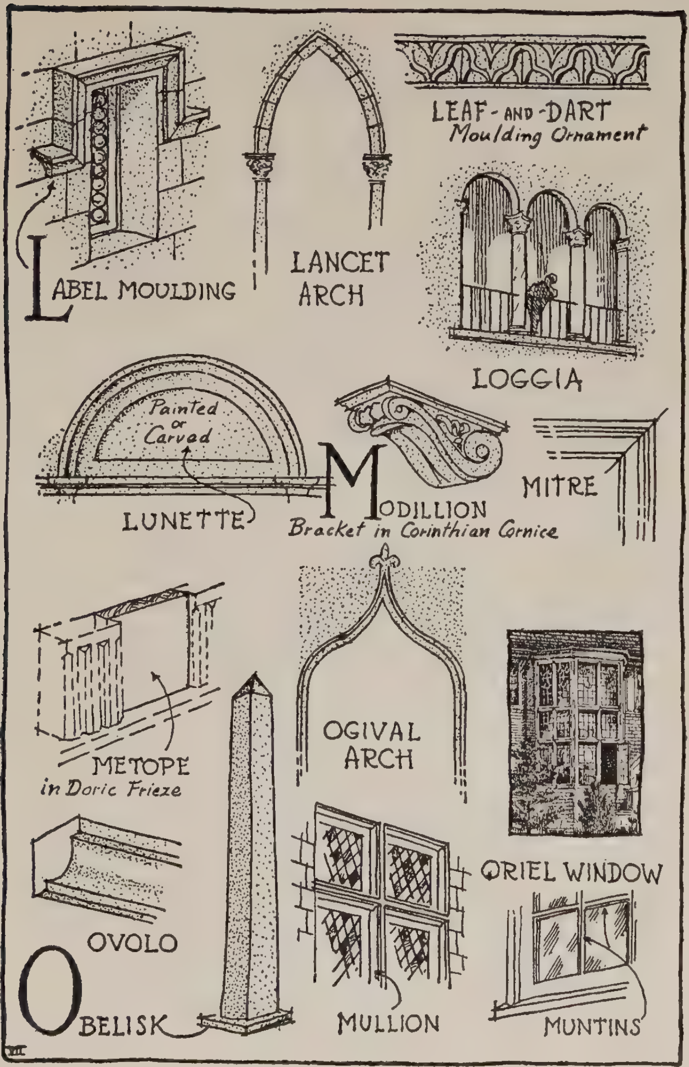

GRILLE of iron

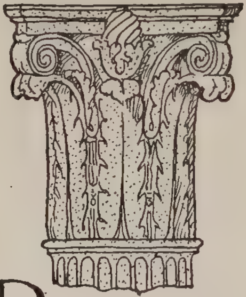

HALF-ROUND MOULDING


HORSESHOE ARCH

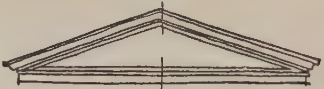

HIP ROOF


HALF-TIMBER WORK

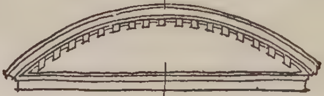

LABEL MOULDING
LANCET ARCH
LEAF-AND-DART
Moulding Ornament
LOGGIA
Painted or Carved
LUNETTE
MODILLION
Bracket in Corinthian Cornice
MITRE
METOPE
in Doric Frieze
OGIVAL ARCH
ORIEL WINDOW
OVOLO
OBELISK
MULLION
MUNTINS



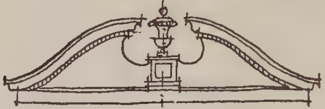
PALMETTE CAPITAL



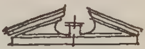
PEDIMENT – *POINTED*



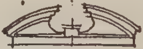
PEDIMENT – *CURVED*



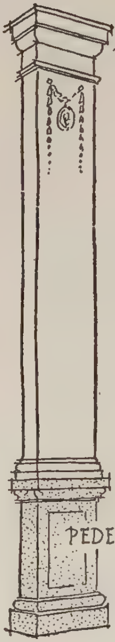
PEDIMENT – *BROKEN*



POINTED PEDIMENT – *BROKEN*

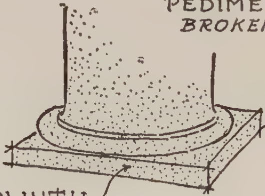


CURVED PEDIMENT – *BROKEN*

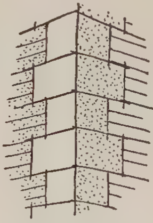


PILASTER

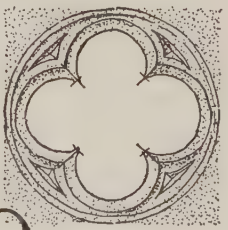
PEDESTAL



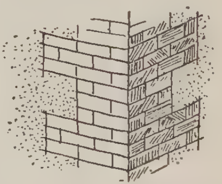
PLINTH



QUOINS – *STONE*

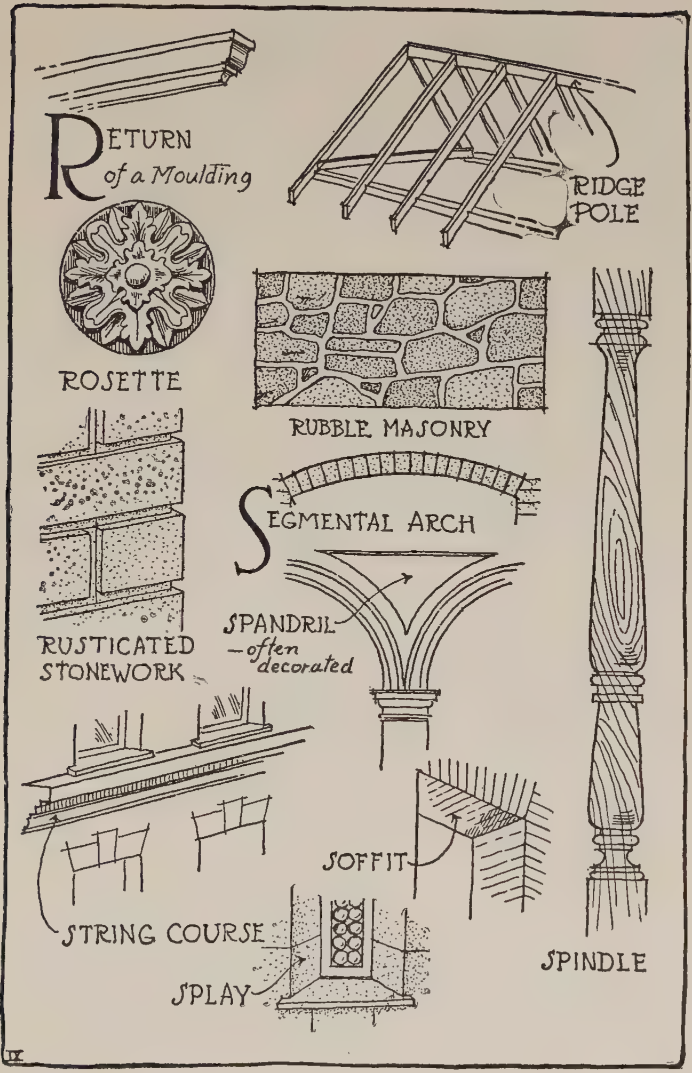


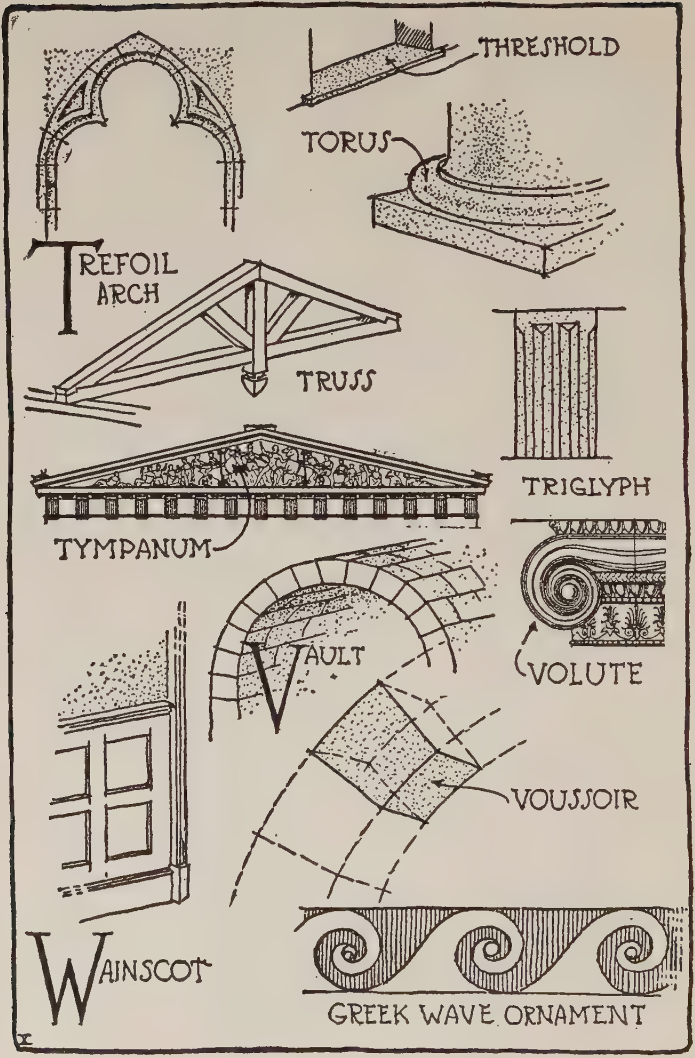
QUATREFOIL



QUOINS – BRICK

VIII


RETURN of a Moulding
RIDGE POLE
ROSETTE
RUBBLE MASONRY
RUSTICATED STONEWORK
SEGMENTAL ARCH
SPANDRIL —often decorated
SOFFIT
STRING COURSE
SPLAY
SPINDLE
IX


THRESHOLD
TORUS
TREFOIL ARCH
TRUSS
TRIGLYPH
TYMPANUM
VAULT
VOLUTE
VOUSSOIR
WAINSCOT
GREEK WAVE ORNAMENT

PART TWO

AN OUTLINE
of
THE STORY OF ARCHITECTURE

PART TWO

AN OUTLINE OF THE STORY OF ARCHITECTURE

as it has developed
through the ages.

CHAPTER 1

The Beginnings

The first things that man built can hardly be called architecture—and yet it is from his first rude attempts to shelter himself from the elements that he later evolved some of the noblest expressions of civilization and gave lasting form to the highest aspirations of the human race.

At first, no doubt, he lived in caves or rude lean-to shelters that involved little or no building; the nomadic peoples, who moved from place to place in season with pasturage for their flocks lived in portable tents of various forms, such as the wigwams of the American Indians. Always the prehistoric and primitive peoples used the materials most immediately at hand and most easy to work. One very early form of dwelling was the "wattle-and-daub," meaning a hut constructed by driving stakes in the ground, interlacing them, like a woven basket, with light branches or reeds and daubing both sides with mud or clay. A fair idea of these earliest efforts at building can be seen today in the more remote parts of the world, where native houses are still made from materials at hand, with virtually no tools, and with complete ignorance of architectural principles. The nipa grass-thatched huts of the Igorote natives of the Philippines, the igloo of the Eskimo—even the log cabins of the first settlers in this country are examples of the un-architectural building of shelters, with time and means for elaboration quite out of the question.

Even when man began the worship of some sort of "God," he was not at first able to erect anything like a temple, and his tribute took the form of a rude stone,

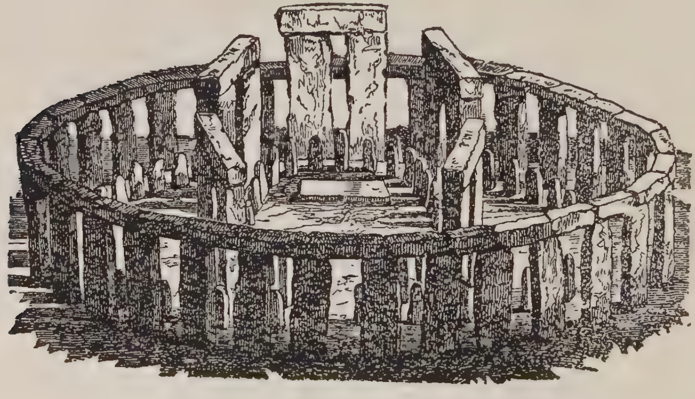


Figure 35
A restoration of pre-historic Stonehenge, on Salisbury Plain, England. It is believed to have been built for religious rites of the ancient Druids.

later roughly hewn as an image, like the strange figures on Easter Island, or the grotesque idols of Polynesia and the South Seas. And there are prehistoric remains through England and Ireland, and on the Continent, the very meaning of which are lost in antiquity. The best known of these is Stonehenge (Fig. 35) in England, that great circle of huge stones, generally supposed to have had something to do with the ancient religious rites of the Druids.

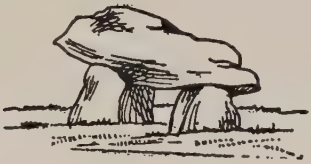


Figure 36
The most elementary form of building. A prehistoric dolmen, the forerunner of architecture.

There is, however, a certain architectural meaning in one large flat stone supported by the two or more uprights. It is the first principle of architecture—the column and lintel—a principle that has come right through to the present day, from Egypt, from Greece, from Rome. The prehistoric version, built of rough stones, is called a dolmen (Fig. 36), and though it may be difficult to see in it any element of architecture, yet it marked the moment when men lifted one stone into position upon others, placed with intention to support it—and this was the beginning of architecture. And, moreover, these dolmens, and also cromlechs, such as the arrangement of Stonehenge, were not built from necessity, as mere temporary shelters, but with some dim idea of building a permanent thing.

Even when such essentially primitive things as these were being built in various parts of the world, building, and the first definite architecture, was taking form in Egypt. Just how far back the Egyptians developed their skill as builders is not known, any more than we know the beginnings of the remarkable architecture of the Mayas and other early races of Central and South America.

In forming even a general idea of any architecture it is very important to have some slight knowledge of the geography of the country, its climate, its religion and something of the kind of government under which things were built. All these matters vitally affect the development of architecture, and explain differences in styles and kinds of buildings, as anyone will see for himself as soon as he begins to notice architecture at all.

Geography governs available building materials. Where stone is plentiful, stone architecture will be found. Where neither stone nor wood are to be had, a brick architecture will develop.

Climate will affect design. In the cold countries of the North, where there is much rain and snow, there will be steep roofs and no provisions for living outdoors. In the warm countries of the South there will be open courtyards or patios, terraces, wide eaves and porticos for shade. Climatic effects on architectural design can be seen all over the world, for human intelligence, it seems, has always found the type of building best suited to accommodate life to a given kind of climate.

Religion will affect the types of building that prevail. With the great civic spirit of Rome, buildings for law-courts, theatres, baths and public works become as important as temples to the gods were to the Greeks and the Egyptians, perhaps more important. And when religion again dominated in the Middle Ages, the Cathedral became the principle work of architecture.

The kind of government, as well as general historical developments also have a decisive part in the trend of architecture. A powerful, centralized government will build more large and important public buildings than a weak, de-centralized government. A country dominated by the priesthood, like Egypt, will build more temples than any other type of building. Prosperity under different forms of government will affect the quantity as well as the quality of architecture from time to time. The extinction of a race, as in the case of the Mayas, will put an end to their architecture, so that no part of it goes on to later times; in the conquest of a country, its architecture may be snuffed out like a candle, it may be influenced by the architecture of the invaders, or the conquerors, returning to their own country, may take back impressions that will affect their own architecture.

All this has happened, as we shall presently see, and it is all a vital part of the story of architecture.

The Master Builders of Antiquity

Let us make a very speedy survey of the architecture that developed from the earliest times we know up to the Renaissance, which is generally considered as the beginning of modern times. And we will include in this only the main stem of architecture that kept on growing, with no more than mention of the off-shoots that died out and left no traces in the architecture we know today.

There was Egypt, with an architecture of stone, a column-and-lintel architecture, built for eternity. Toward its end grew up the civilization of Assyria, which evolved a brick architecture and developed the arch, which, however, did not interest the Greeks, who carried the column-and-lintel type to its perfection. The Romans, a practical and acquisitive people, took over much of the Greek scheme of architecture, but made the arch an important feature. Through the 10th and 11th centuries the Romanesque style grew out of Roman architecture, and through experimentation with arch and vault constructions the Romanesque led, late in the 12th century, directly to the Gothic style, which dominated architectural thought until the year 1400, when the revival of interest in classical antiquity, called the Renaissance, brought back the arts not only of Rome, but of Greece as well. And for three centuries the spirit of the Renaissance dominated the architecture of Italy, Spain, France, the Low Countries and England, bringing us up to the 18th century, and even further, because the architecture of the Renaissance is still one of the strongest influences in architectural design of today.

In the preceding paragraph we have travelled too fast to learn much besides the *continuity* of architecture, and the sequence of seven definite styles, so we must retrace our steps to Egypt, and proceeding a little more slowly, outline in the briefest manner possible the most important high-lights of the styles that followed one after another, through many years and several lands, to give us most of what we call architecture today.

Ancient Egypt, Land of the Temple-Builders and the Architecture of Column-and-Lintel

In a way that was to be duplicated centuries later, in the Middle Ages, in Europe, the priests of ancient Egypt had all the knowledge of their day and, consequently, most of the power. They virtually ruled the country, so that it is not at all surprising that most of the architectural effort went into the building of temples.

There were many gods, served with elaborate rites; there was much mystery in the old Egyptian rituals, and by way of further taking men's thoughts from non-religious (secular) buildings, the importance of life after death was made the principal thought during life on earth.

Tombs, however, contributed nothing to architecture, even the great pyramids, which represent a remarkable feat in building, but nothing more. And when kings and dignitaries did not build pyramids as tombs, they tunnelled into the rock of the Theban hills, provided a mortuary chamber where they believed their remains would rest through eternity, and had the entrance of their burial place concealed as completely as human artifice could contrive. Here, certainly, was nothing architectural, and the elaborate ritualistic collections of furniture, chariots, jewelry and other things that have been discovered in the old tombs serve only to throw light on ancient Egyptian burial customs, and on the development of their useful and decorative arts.

Their houses were of perishable construction, and judging from pictures carved and painted on walls were very simple in nature. Peasant huts were of sun-baked mud, and the better houses were of stout reeds, bundled together to form posts, and plastered with clay. Wood was very scarce, and reed seems to have been used much as the Chinese and Japanese have always used bamboo. Sun-baked brick was often used, and there are indications that some houses were two and three stories high. As in Egypt today, house roofs were flat and much used for sitting and sleeping in the cool of the evening.

There is reason enough for looking to Egypt as the land of earliest civilization, much or little as we may know about China. The oldest remains found in Egypt, those of the "prehistoric" period show a high degree of development in art and craft, and this period is commonly given as 23,000 B. C. to 4777 B. C. The Ancient Empire lasted from 4777 to 2821 B. C., and the Middle and New Empires extended to 950 B. C. In China the oldest historic dynasty (Chou) is dated 1122 to 255 B. C. Of the antiquity of the lost civilization of Central America we have no record or date.

The great building projects of Egypt were made possible by the virtually unlimited thousands of workmen available, mostly slaves and captives of war, and by the authority of a despotic centralized government.

One of the principal ideals of Egyptian architecture seems to have been the use of the largest possible stones, and while certain elementary engineering principles must have been necessary for handling them, it is fairly well established that the principal factor was human labor.

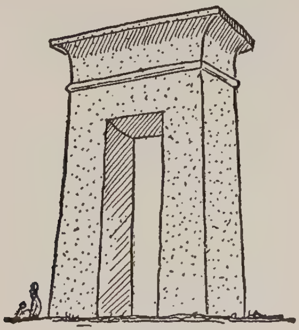


Figure 37

An Egyptian pylon, or gateway. With twin obelisks and an avenue of sphinxes it formed the approach to the temple.

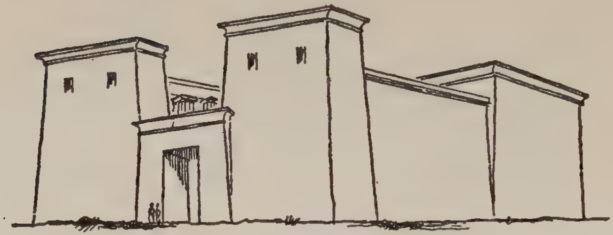


Figure 38
The typical Egyptian temple exterior showed no columns, and concealed all its mysteries behind high walls.

Although the Egyptians understood the principle of the arch, they made no architectural use of it, because they despised building with small stones. Arched drains, built of brick, have been found beneath ruins dating from 4000 B. C.

The Egyptian temple, except for its approach, was not designed, like the Greek temple, for exterior appearance. The approach, where it was carried out in full, consisted of an avenue of sphinxes, a detached pylon (Fig. 37), or gateway and two obelisks, like the one now standing in Central Park, New York City. The temple itself was surrounded by a high wall, and the exposed columns seen in many pictures of Egyptian temples are deceptive, because the original walls have fallen down or been removed. No columns were visible from outside in the Egyptian temple idea (Fig. 38), which was based on mystery and concealment. Unlike the temples of later races, these were not for public worship, and rites were performed in them for the people only by priests and royalty.

Within the entrance portal was a court, from which a columned hall led to inner sanctuaries. The roofs were of heavy stone slabs, and little, if any, light was admitted to the interior.

There were many varieties of columns in Egyptian architecture, but the two most typical (Fig. 39) are those with bell-shaped capitals, like giant lotus flowers, and the columns derived in design from bundles of reeds bound together. The heads of these columns suggest the lotus bud, and both types of column are characteristically Egyptian, and both are seen in the great temples of Karnak (Figs. 40 and 41).

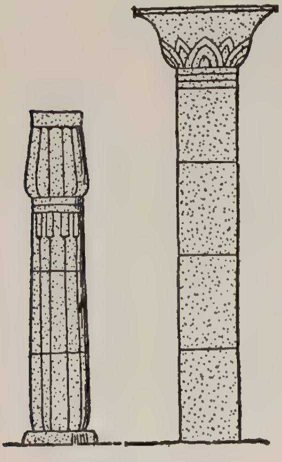


Figure 39
Two of the most frequently used types of Egyptian columns, the "lotus-stalk" and "bell" forms.

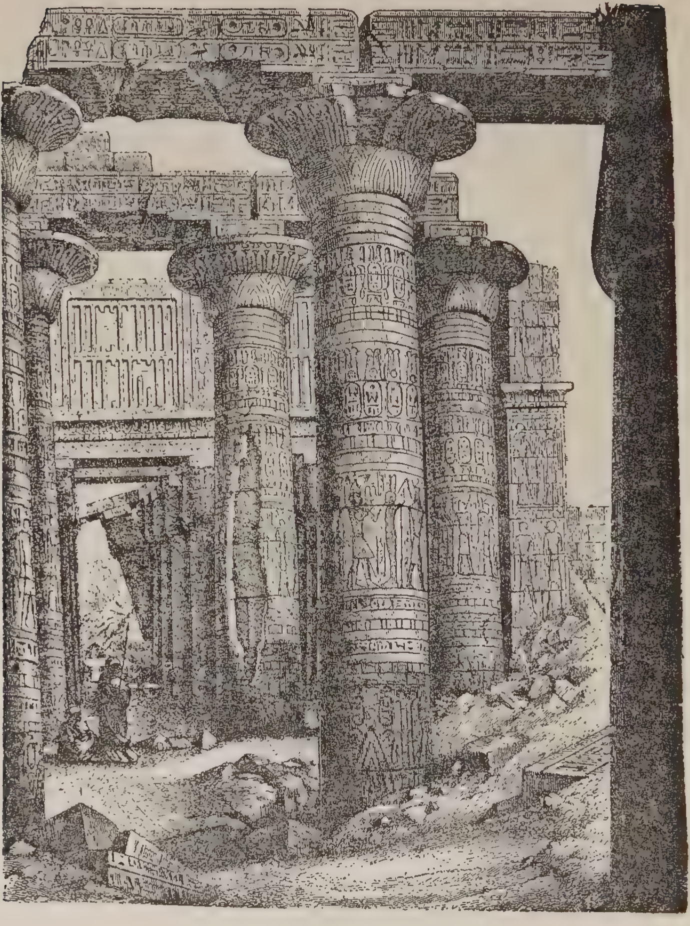


Figure 40
Ruins of the great temple of Karnak, Egypt, illustrating the Egyptian manner of applying profuse surface decoration to columns.

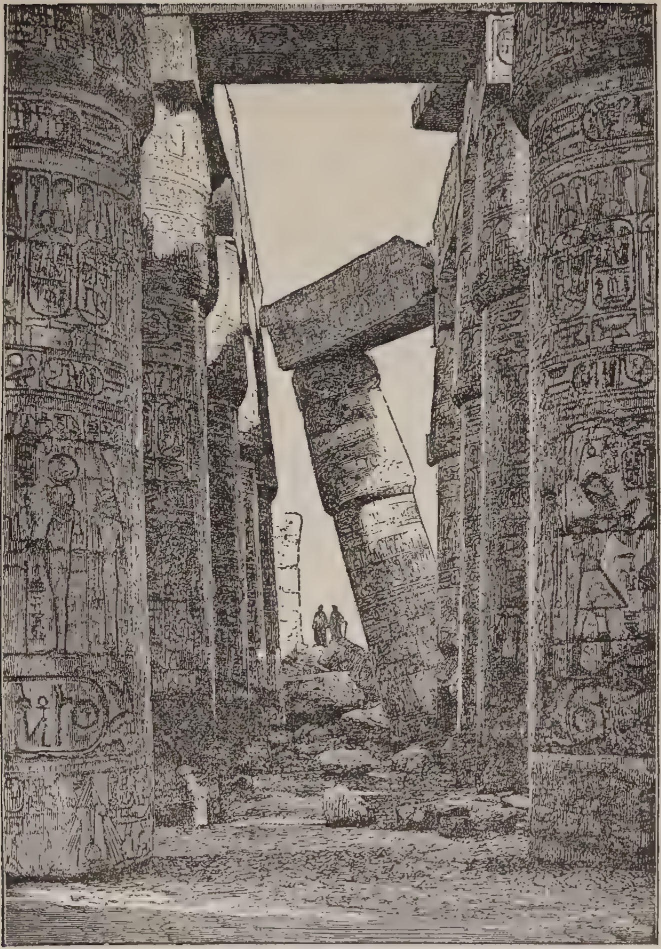


Figure 41
Ruins of the great temple of Karnak, Egypt. Both the lotus-stalk and bell type of Egyptian capitals were used at Karnak.

A trick of design that adds much to the appearance of great strength and stability in Egyptian architecture is the slope of the walls, towers and pylons outward toward the base. Walls with this slope are called "battered" in architectural language (Fig. 38).

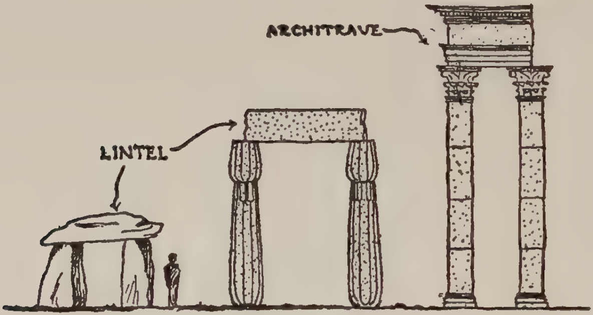


Figure 42
An architectural evolution seen in the progress from the crude pre-historic dolmen to the refined Greek-Corinthian temple.

Egyptian architecture was greatly given to surface decoration in brightly colored "incised" or low-relief. This was usually done on a smooth stucco or cement coating applied on the stone walls and columns. The stucco was given a wash of color, on which figures and hieroglyphic writing were drawn in red outline. These outlines were cut-in, or "incised," and the edges of the figures rounded, after which they were colored, usually with the primaries, red, blue and yellow. Many of the colors, especially in the shelter of the sealed tombs, are as bright today as when they were painted, and reveal the Egyptians as brilliant colorists.

But we must get on to the immortal architecture of Greece, after a few words on some ancient styles that flourished and died out, or had no influence on later architecture. Of Egypt it is important mainly to remember its column-and-lintel construction, which, in principle, is seen in the rude dolmens of prehistoric man and, later, in the infinitely refined development given it by the Greeks (Fig. 42).

The Brickbuilders of Assyria

Here, on the plains of Mesopotamia, separated from Egypt by the Red Sea and the Arabian desert, a different architectural story was written in brick. As in Egypt there was no timber, but neither had these people any stone. The nature of their country forced them to the use of brick, which they developed as a building material more fully than any other early race. They were, in fact, the pioneer brickbuilders. Their bricks were baked and unbaked, glazed and unglazed. As there was very little fuel they could burn to bake bricks, the baked and glazed brick that they made, using fires of dried grass, were reserved for facings and the bulk of the walls and terraces consisted of bricks which were laid while still in a plastic state and baked together by the heat of the sun.

Brick being a small unit of construction, the builders of Babylon and Nineveh made ample use of the arch, not only in its true form, but in the form called "corbelled" (Fig. 45).

In this country Babylon was the great city, in fact as well as legend, and its greatness survived its conquest by the Assyrians. "The Hanging Gardens of Babylon," cited by the ancients as one of the Seven Wonders of the World, were no doubt gardens laid out on the great stepped terraces of the palace, gardens which, seen across the flat plains must have seemed to hang in the air. The earliest King of Babylon ruled about 4500 B. C., and in 1700 B. C. the northern part of the Babylonian Kingdom, Assyria, became in-

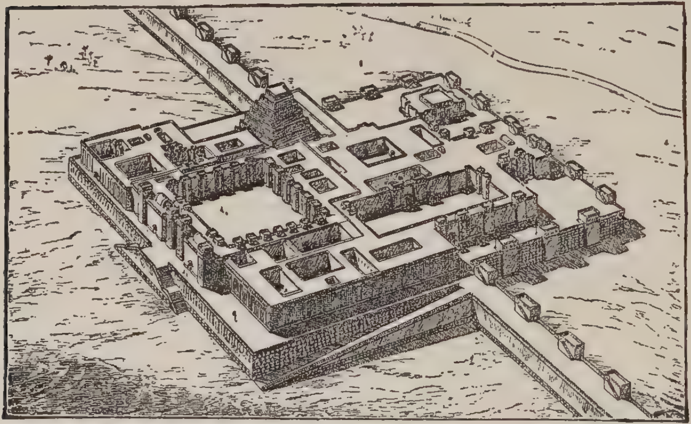


Figure 43
A restoration of the royal palace of Dur-Sarginu, showing the main characteristics of ancient Assyrian architecture.

dependent. Its people were very warlike and even went against Egypt successfully. Assyrian prowess in war has a direct bearing on its architecture because it is difficult to imagine the building of the great palaces without vast numbers of captive workmen. These palaces, of broad extent, were built on raised platforms of brick (now crumbled into shapeless mounds) and the archæologist Rawlinson estimates that the mound of Nineveh must have taken ten thousand men twelve years to build, even before its top was ready for the erection of the palaces and the temple tower.

In effect the Assyrian palace was built on a great artificial plateau, raised high above the miasmic vapors of the low-lying plain, and this plateau was reached by long ramps or inclined roadways up which chariots could be driven (Fig. 43). It is interesting to find that ramps are again being used instead of stairs in our own day as a means of helping crowds to move quickly in our newest and largest railroad stations.

Archæologists, after years of patient study, have reconstructed the general arrangement of the great Assyrian palaces, and Figure 43 is taken from one of their works to show this arrangement. The palace platform is seen to be partly within and partly outside the fortified city wall. On the outside it is guarded by battlemented towers, and on the inside stairways and ramps lead up to the imposing gateway that admits to the broad open court. About this court are arranged the various rooms of the palace, and rising above all these is the pyramidal temple tower. The top of this,

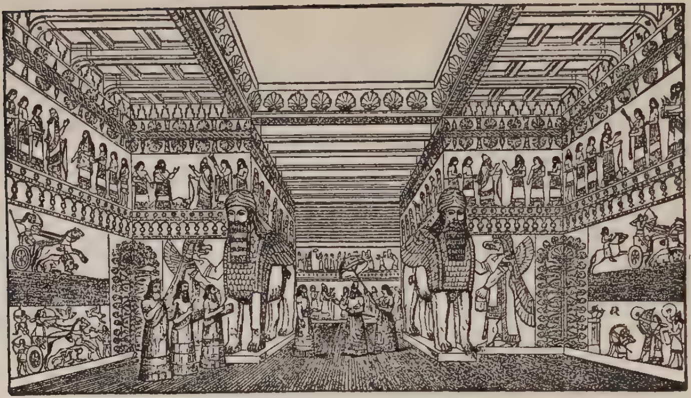


Figure 44

An Assyrian palace interior, restored, showing the great figures of winged bulls, of which several were found in the ruins of Nineveh.

which is the temple chamber, largely used for astrological observations, is reached by a continuous ramp winding around all four sides of the tower.

For a vanished civilization, these palaces represent very ambitious architectural projects. With walls entirely of brick, it is believed that the rooms were roofed with timber brought from a considerable distance. Decoration was all in glazed brick, flat or in low-relief, because the absence of stone discouraged the sculptured features that were so plentiful in Egyptian architecture. The most notable of Assyrian sculptures, indeed, are the colossal human-headed winged bulls found at Nineveh, and seen in an imaginary drawing of an Assyrian palace interior (Fig. 44). This interior is drawn from the remains discovered at Nineveh, and shows the elaborate pictorial wall-decorations that were characteristic.

Assyria, with all its warlike pomp and the magnificence of its great palaces, was finally overcome by Persia in 539 B. C. Persia developed an architecture of its own, but one that did not survive the days of its greatness, when Susa and Persepolis were important places. The Persians used stone columns, and also columns of wood, but their lighter character is not seen again when we return to the main stem of architecture as carried on by the Greeks.

With the days of greatness of Egypt, Babylon, Assyria and Persia a thing of the past, the architectural stage was now cleared for that younger race, the Greeks, whose arts so far progressed beyond the works of any others of the ancient peoples that much of our own art is based on them.

Unrelated Styles in Various Corners of the World

Meanwhile, and before getting on with Greek architecture, several now extinct styles in other parts of the world are worth noticing.

The architecture of Assyria is one that did not survive, and in India, in China and Japan and in Central America men were building elaborately and skilfully, but in styles that are not any part of our architecture of today.

Like the Assyrians, the Mayas, or whatever older and now entirely unknown race built up a strange order of civilization in Central America, elevated their temples on great mounds or pyramids. The remains of their buildings show a high degree of skill in masonry and stone-carving though the builders seem not to have discovered the principle of the true arch, and built only arches of the corbelled type (Fig. 45). One of the most interesting of all archæological activities today is the effort of scientists to unravel the secrets of the lost races who left such remarkable monuments buried in the jungles of Honduras and Yucatan. There were strange gods and strange ceremonies, great and powerful rulers, a people skilled in arts and crafts, but a people whose history is known only in scattered fragments. In Egypt the reading of hieroglyphic inscriptions on walls and on papyrus documents revealed the whole history of the nation from an early date, but

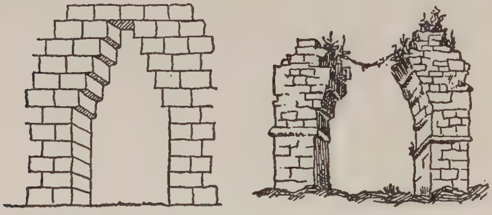


Figure 45
The "corbelled" type of arch, and the ruins of an ancient corbelled arch found at Kabah, in the jungles of Yucatan.

toward reading the picture-writing of the ancient civilization of Central America only a slight beginning has been made.

The architecture of China, and of Japan which derived a great deal from China, reached a very high stage of development, but did not influence the architecture of other countries. There were some stone temples and palaces, and much elaborate wood construction, richly lacquered, gilded and carved. The most characteristic thing in both Chinese and Japanese architecture is the curved roof-line, seen in pagodas (Fig. 46) and temples, with wide-spreading eaves. Tiles were

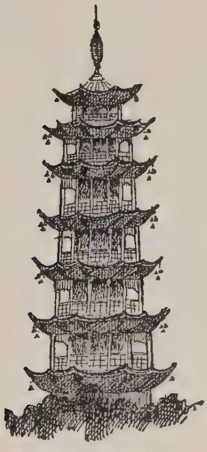


Figure 46

A Chinese pagoda, illustrating the upward-flaring eaves peculiar to Chinese and Japanese architecture.

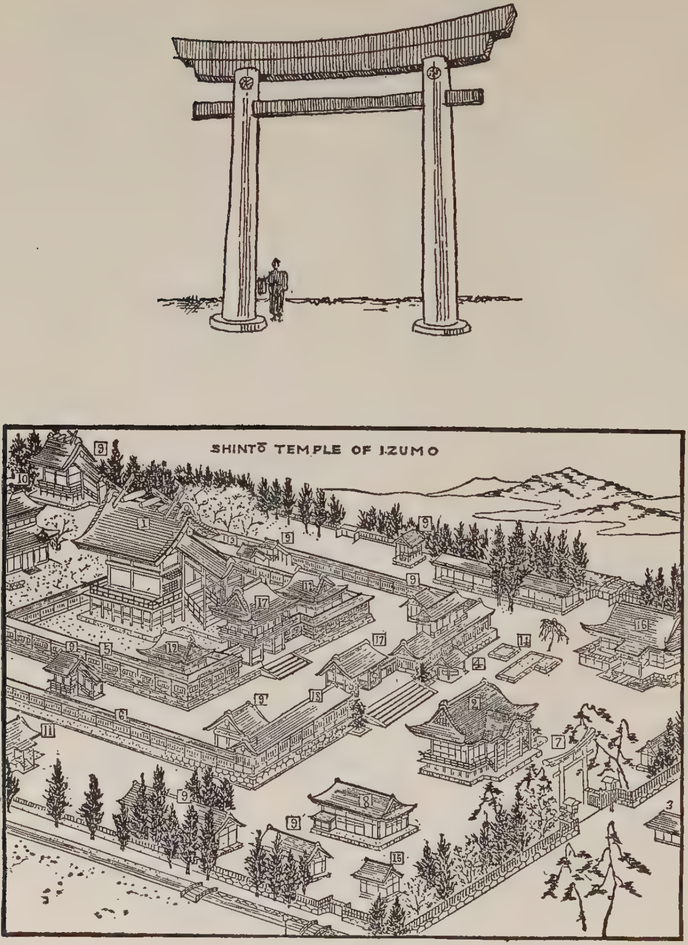


Figure 47
Japanese "tori" entrance, and a general view of the group of buildings of the Shinto temple of Izumo.

used for the roofing of permanent buildings, and both China and Japan show the early development of a very high degree of artifice in construction and in the handling of materials. Incidentally, there is an interesting similarity in purpose in the memorial gateway, or torii (Fig. 47) which is usually a part of the temple approach to the Egyptian pylon which stood before the temples of the Nile.

In India and in Java there are well-preserved remains of intricately carved temples, many of them of vast extent, like the huge pile of sculptured masonry at Boro Boedoer, in the heart of Java. To devote any study to these here, however, would take us too far away from the main stem of architectural evolution, which originated in Egypt, saw a development dictated by building materials in Assyria, and now carries on through the architecture of the Greeks.

Greek Architecture and the Birth of the Classic Ideal

As in Egypt, Greek architecture was a stone architecture, but here the stone was marble, which was plentiful in Greece, and a material that could be worked with greater refinement of detail than was possible with the limestone of the Egyptians.

The Greek people, being of the kind they were, naturally developed a new architecture. In civilization they had some of the vigor of the more primitive Northern races and some of the culture of old Eastern peoples. The early Greeks, known as Pelasgi, built heavily and rather crudely, using great rough-hewn blocks of stone. They were conquered by the Achæns, or Homeric Greeks from the North, who were, in turn, conquered by the Dorians, hardy mountaineers also from the North. Classic Greece, then, was populated by survivals of all three of these races, and it was from their combination that the great civilization of Greece arose.

The Greeks were lovers of art, literature, philosophy, music and the drama; beauty and physical perfection were their ideals and much of their character is reflected in their great national athletic games and contests, and in the pageantry of their religious festivals.

In the year 650 B. C., five hundred years after the fall of Troy, the civilization that has been called "Hellenic" (from "Hellenes" the Greek word for "The Greeks") was beginning to express the Classic Ideal in architecture and sculpture. This Classic Ideal, which has reappeared several times in the history of architecture and still exists, was simply the ideal of purity and refinement, of beautiful proportions and of freedom from the profusion that characterized the art of Egypt and Assyria. And it is because the Greeks expressed the Classic Ideal that Greek architecture has always been given such an important place in all studies of art, and especially in all architectural training. There was a time, late in the 18th and early in the 19th centuries, when a familiarity with Greek and

Roman architecture was considered a part of a gentleman's education. It was called the "Classic Taste" and has strongly influenced architecture at various times, including our own.

Greek architecture was like Egyptian in that it kept to the column-and-lintel type of construction. It was an architecture of columns, and the arch was still considered an unimportant and insignificant thing.

Greek architecture was unlike Egyptian in that its builders had the ideal of a beautiful exterior constantly before them. Their great colonnades were not concealed behind high walls. Temples were usually raised three steps, or more, above the ground, and in every way were refined in proportion and ornamentation to a degree of purity that had never before been seen in the world.

And the Greeks designed and perfected what have since been known as "The Three Orders," to which the Romans added two others, making "The Five Orders."

What is an "order" of architecture?

The term is only applied to Classic architecture (meaning Greek and Roman) and it means including the base, the shaft and the capital or head, combined with the entablature, or what rests on the column. The entablature, further, is divided into three parts which are the architrave, resting directly on the columns, the frieze, directly above the architrave, and the cornice, forming the uppermost part (Fig. 48).

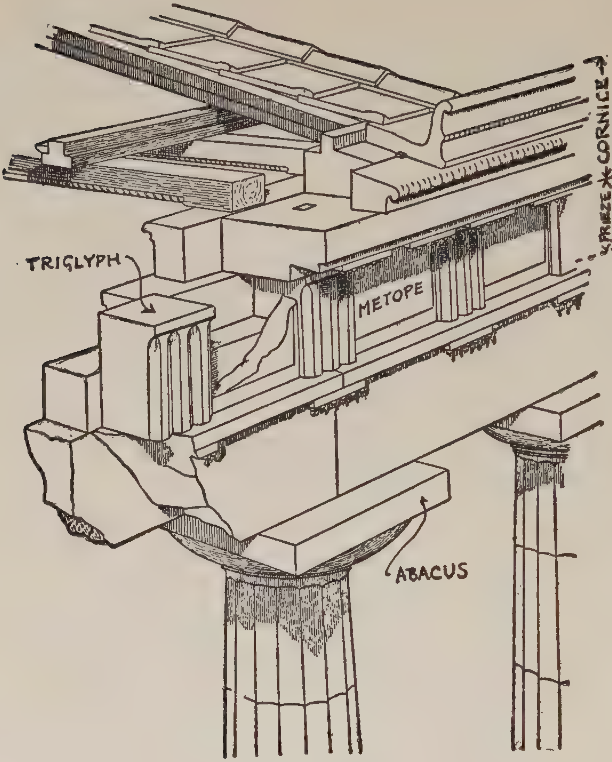


Figure 48
Greek Doric construction, showing the principal parts of the first of the classic orders.

The three Classic Greek orders are Doric, Ionic and Corinthian, to which the Romans added the Composite and the Tuscan (often called the Roman Doric) (Figs. 49, 50, 53, 55, 56, 60.)

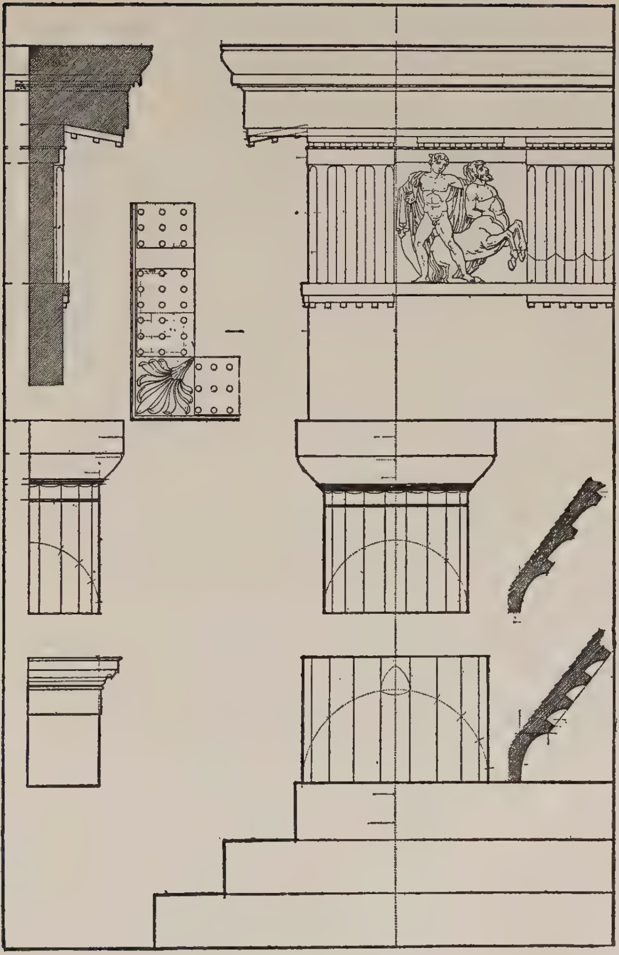


Figure 49
An architectural drawing of the Greek Doric Order, showing characteristic sculptured treatment of the metope.

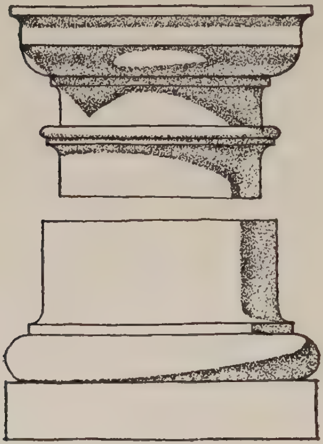


Figure 50
Capital and base of the Roman Doric, sometimes called the Tuscan Order. This order became very popular in the Italian Renaissance.

The Doric Order is the plainest of all the orders, and is the only one that has no base. Some authorities on architecture have the theory that the Greek Doric temples were copies in stone of earlier wooden buildings, while others are equally sure that the Greeks simply took the temples of the Egyptians as a type and refined them. At Beni Hasan in Egypt there is a rock-cut temple with many-sided columns resembling the Greek Doric, and this is considered by some to prove the connection of Doric Greek architecture with Egypt. Still simpler is the theory that the early Greek builders, wishing to lighten the effect of the cylindrical column, cut it in many narrow faces, then, to lighten the effect still further, these faces were hollowed out, making the "flutes," as they are called, of the Doric column.

The capital of the Doric column is made up of a flat, bowl-shaped member immediately surmounting the shaft, and above this a square, flat block, called the abacus, on which rests the architrave (Fig. 48).

The Doric architrave is perfectly plain, and the frieze is divided up into squares, called metopes, by grooved blocks called triglyphs. The metopes, as in the Parthenon, were often sculptured, which illustrates the limited use of sculpture in Greek as compared with Egyptian temples. The Greeks placed their sculpture in certain places, such as in the metopes, on a frieze or in the "tympanum," or pointed space within the roof pediment, while the Egyptians very often entirely covered their walls and columns with carved figures and hieroglyphs.

The Doric cornice consists of a plain overhanging block, with a stone gutter over it, above which the roof rose at a slight incline, constructed of timber, supporting thin slabs of marble (see Fig. 48).

The perfection of the Doric order of Greek architecture is generally considered to be seen in the Parthenon, the great temple built to the goddess Pallas Athena on the Acropolis of Athens, in 454 B. C. (Fig. 51).

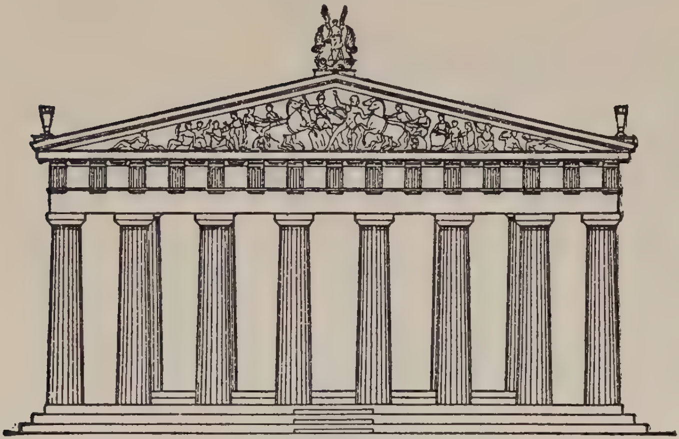
Even its ruins are fine and majestic, because all its proportions are beautiful—not only the proportions of

Figure 51
The Parthenon, the famous temple to Pallas Athena, built on the Acropolis of Athens. This temple is generally regarded, even in its present state of ruin, as one of the finest examples of pure architecture in the world.

the columns, considered separately, but the proportions of the whole building (Fig. 51). The temple of Theseus, a similar Greek Doric temple, is seen in Figure 52, together with a restoration of the front elevation of the Temple of Zeus at Olympia, another of the Parthenon type.

As the Greek perception of refinement grew, it developed the second of the three Greek "orders"—The Ionic. This order is always recognizable by the "spiral volute," or scroll, of the capital, a motive generally considered to have come from Asia Minor.

The Ionic Order (Fig. 53) is taller than the Doric,



A restoration of the Greek Doric Temple of Zeus at Olympia, showing the sculptured treatment of the tympanum of the pediment.

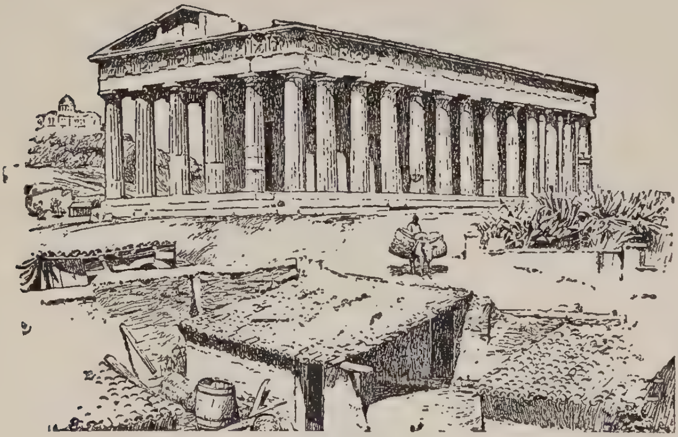


Figure 52

The Greek Doric Temple of Theseus, in Athens, an example of the typical Doric Temple better preserved than the Parthenon.

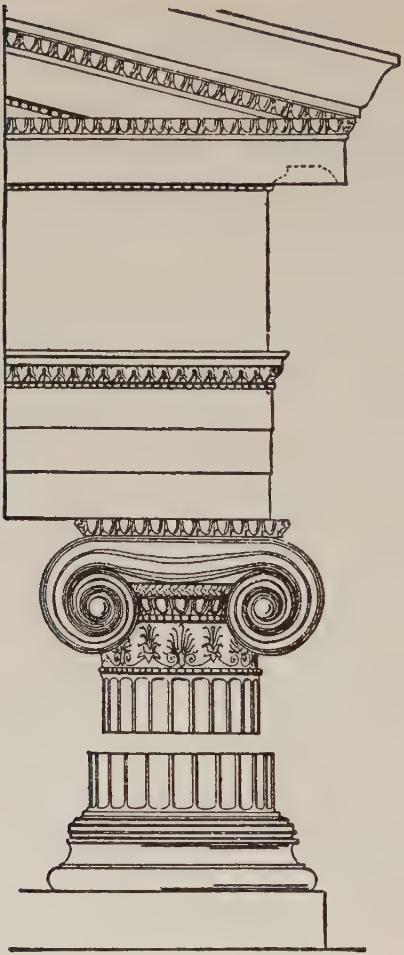


Figure 53
The base, capital and entablature of the Greek Ionic Order, taken from the columns of the Erechtheion, on the Acropolis of Athens.

and has twenty-four flutes, or grooves, which are spaced, instead of meeting in sharp edges like the flutes of the Doric Order, and the base consists of mouldings, and rests on a square block or plinth. The entablature differs from the Doric in that the architrave is split into three horizontal divisions, each projecting slightly; the frieze is plain, without the Doric triglyphs and metopes, unless decorated with a continuous band of sculpture; and the cornice is composed of a variety of typical Greek mouldings, usually decorated with typical ornamentation (see Fig. 59).

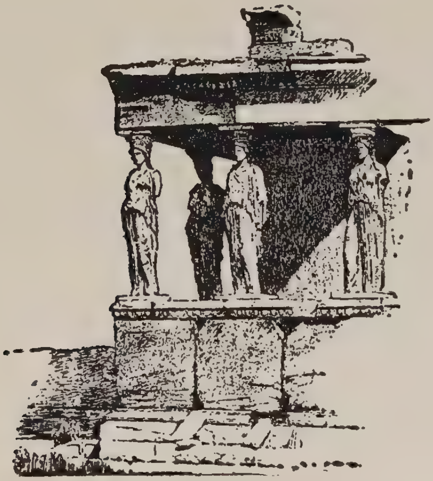


Figure 54
The famous Caryatid porch of the Erechtheion, on a Greek Ionic Temple on the Acropolis.

One of the most beautiful of all the achievements of Greek architecture is the famous Caryatid Porch (Fig. 54), which was part of a temple called the Erechtheion, built in 420 B. C. on the Acropolis of Athens. This porch has always been particularly admired by architects because of the remarkable architectural character given to the four human figures which, instead of columns, support the entablature. These figures represent a very high degree of pure art because their design is so definitely expressive of their use as supports for the entablature which rests on their heads. They seem strong, yet beautifully graceful, and the folds of the draperies plainly suggest the flutes of the Greek columns. We cannot help comparing this beautiful development of the column-and-lintel idea with the crude "dolmens" of uncivilized, prehistoric builders whose instincts toward an ultimate architecture prompted them to place one great rough stone horizontally upon two rough stone uprights that corresponded to columns. And we are impressed with the marvelous development of architectural genius at this early date, 420 B. C.—still within the distant era of antiquity.

An even greater achievement in design was the column capital of the Corinthian Order (Figs. 55 and 57), which, though it was originated by the Greeks, was further developed and much more extensively used by the Romans.

On a base not unlike that of the Ionic column, the Corinthian shaft rose even taller than the Ionic, and the entablature was more elaborate in its combination

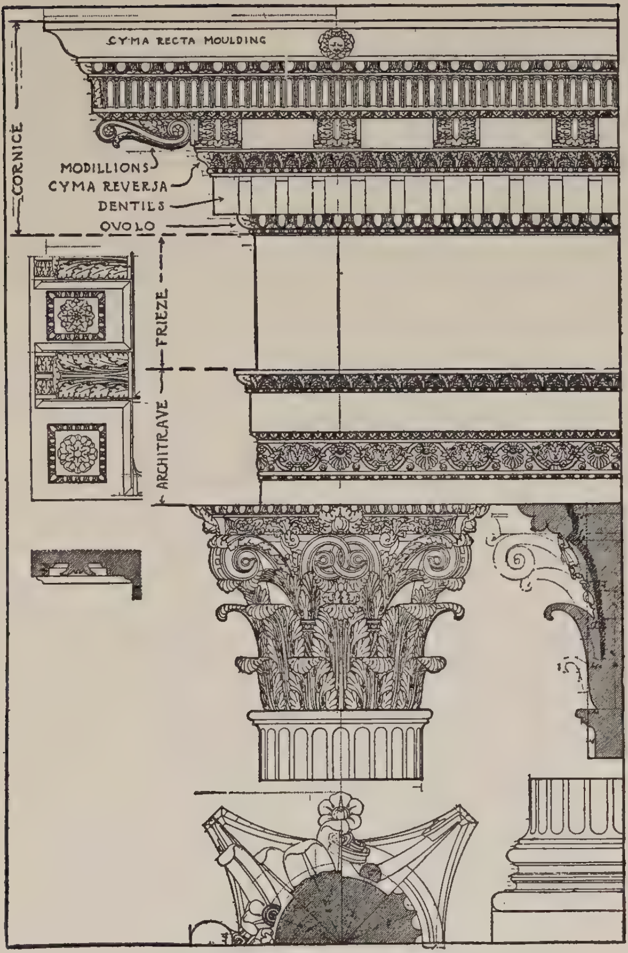


Figure 55
An architectural drawing of the Corinthian Order, showing ornamented mouldings, the modillion brackets, and the coffers under the overhang.

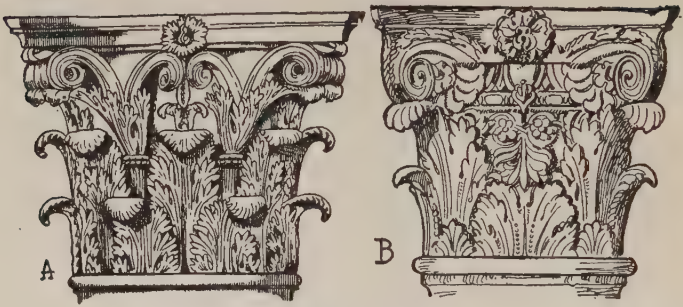


Figure 56
A comparison of the Greek Corinthian capital and the Roman Composite capital. The general profile is the same, but the Roman capital has some characteristics of the Greek Ionic.

of mouldings, especially as designed later by the Romans.

But it is the Corinthian capital that illustrates with remarkable clearness the real meaning of architectural design. Architectural design really means the beautifying of any structural fact. The principle of a lintel resting on two columns is a structural fact, and one of the simplest of all structural facts. We have seen that, as a fact, it was expressed by the primitive prehistoric builders of dolmens, when they placed one rude stone upon two upright stones. It was expressed by the Egyptians, with their massively hewn lintels resting upon equally massive columns. It was expressed later by the Greeks in their sturdy Doric column and entablature. Here the entablature, representing the lintel, was elaborated, or *designed,* and the bowl-shaped capital was an effort to make some sort of a pleasing transition

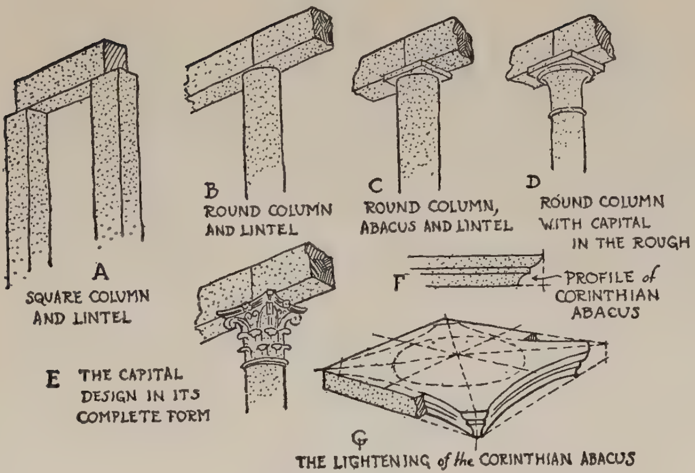

A
SQUARE COLUMN AND LINTEL
B
ROUND COLUMN AND LINTEL
C
ROUND COLUMN, ABACUS AND LINTEL
D
ROUND COLUMN WITH CAPITAL IN THE ROUGH
E
THE CAPITAL DESIGN IN ITS COMPLETE FORM
F
PROFILE of CORINTHIAN ABACUS
G
THE LIGHTENING of the CORINTHIAN ABACUS

Figure 57

The evolution of the Corinthian capital, from the original problem of column-and-lintel construction to its finished form.

from the vertical column to the horizontal lintel resting upon it. The Greek Ionic column sought to accomplish the same thing with more grace and beauty—and the Corinthian capital was the master-solution of the problem. It was a beautiful treatment of a plain architectural fact. Let us examine it and see just why the Corinthian capital is such an important example of architectural design. If we understand its anatomy we are in a way to intelligently understand all of architecture.

The first sketch (A in Fig. 57) shows the plain architectural fact—a lintel resting on two square posts—an architectural essay easily to be accomplished with children's building blocks. The second sketch, B, shows the squared lintel and one of its supports, which, rounded into a cylinder, has now become a column. The rounding off of its corners until the cylindrical form is reached is the first effort to make it seem lighter and more graceful. The cutting of the vertical grooves or flutes in the Greek columns was done for the same reason. Sketch C shows that the early builder felt that the connection of the vertical column with the horizontal lintel might be given a more pleasing appearance if something were placed between them. This is the block, or "abacus" of the Doric capital, later refined a little in the Ionic, and both types of capital sought to make the junction of vertical and horizontal more easy and graceful.

But, in addition to reconciling the vertical column and the horizontal lintel—the inescapable structural fact—there was the additional problem of reconciling the cylindrical form of the column shaft with the squared form of the lintel resting on it. Both problems were brilliantly met by the design of the Corinthian capital. Let us briefly analyze it.

First, the height of the capital is sufficient to draw the eye some way down the shaft. Then the acanthus leaves, springing upward and outward from the neck of the capital accomplish two important things. They make (in profile) an easy transition from the vertical shaft to the horizontal lintel and (in plan) an equally easy transition from the cylindrical shaft to the abacus, upon which the lintel rests. And the old plain, square abacus is softened in its shape so that its heavy profile is lightened by being given a moulding (F) and its former heaviness is overcome by its concave sides (G). As an additional means of gracefully bringing the profile of the capital into a pleasing relationship to the abacus and the horizontal lintel, four scrolls spring outward, apparently from behind the acanthus leaves, to the cut-off corners of the abacus. (Figs. 55 and 56).

The Corinthian capital, in fact, illustrates the entire meaning of the word *design* about as well as any one single example I can think of, and I have always been inclined to think of it as a triumph of intentional, motivated design than as an accidental evolution, as is often suggested by architectural writers. It is said that it developed from the Egyptian bell-shaped, or lotus capital columns, as at Karnak (Fig. 39); or from bands of leaf ornament under the Ionic capital, or from the accidental observation of a basket about which acanthus leaves had grown (Fig. 58). Sketches like Figure 58 have been made to give form to this theory, but it is unlikely, from its nature, and if the

Figure 58
Illustration of an unlikely theory of the origin of the Corinthian capital, in which acanthus leaves have grown up about a basket.

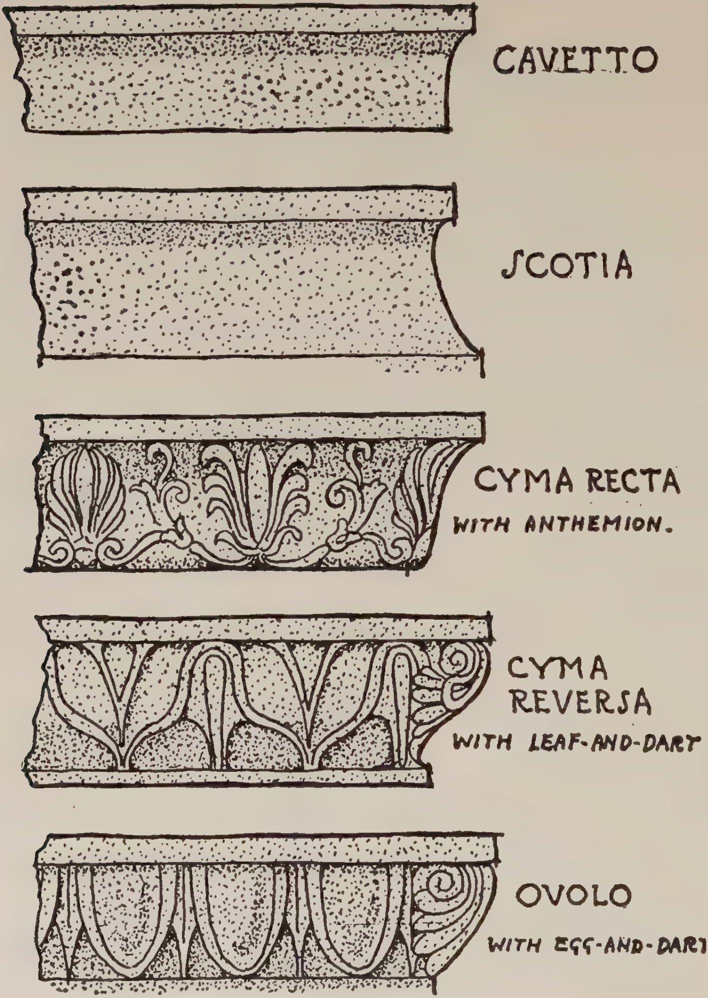


Figure 59
Several of the most frequently used Greek mouldings, with the ornamentation usually given them.

theory of Egyptian origin were true, why did the Greeks first evolve their Doric and Ionic Capitals?

I have gone into some detail in this short discussion of the Corinthian capital because I consider that its value as an illustration of the meaning of *design in architecture* is well worth a demonstration. Good architectural design is design which intends to beautify some bare structural fact which is not in itself beautiful. It is design with a meaning, and when meaning is lacking, design, in its true sense does not exist: it is merely ornament, which is quite a different thing.

Speaking of ornament, it is decidedly a part of the story of architecture to consider a few of the more typical architectural ornaments developed by the Greeks, because these are still very much in use today.

Like Greek architecture, much Greek ornament originated in Egypt and Asia Minor. The exact origins of many of the motifs of Greek ornament have been the subject of elaborate arguments among scholars, and though these theories are extremely interesting, it would be impossible to quote them in a story which must move as rapidly as the present one.

A group of the most frequently used mouldings, with their names, has been arranged to show the ornaments generally employed to decorate them (Fig. 59).

These mouldings, as well as their ornamentation, became a part of Roman architecture, and later a part of the architecture of the Renaissance period, and they are used today in the design of all buildings of Classic or Renaissance character.

To be familiar with them is to increase one's knowledge and appreciation of architecture manyfold, and to avail oneself of a little more of the great legacy of art left to us by Classical antiquity.

No outline of the immortal architectural styles evolved by the Greeks for their temples should overlook the growing popularity for the Greek secular buildings that were the fore-runners of the great civic architecture of Imperial Rome. The growth of public buildings in Greece marked a great difference from the strictly religious, or temple architecture of Egypt, and meant the real beginning of architecture as we know it today, and as it has evolved into an expression of what we call our present civilization. And the architecture of Rome developed this still further.

In Greece, too, the private houses of citizens of means began to assume an architectural character, their principal feature being the atrium, or open colonnaded court in the center, usually with a pool or fountain—definitely the origin of the patio in later and present day houses of Italy and Spain.

Among important public buildings there were the theatres, the agoras, the stadions and the palaestra. Theatres were most frequently built on hillsides which naturally aided the sloping tiers of seats, which were arranged in semi-circles facing the stage. The drama was an important part of the cultural life of the Greeks, and their theatres meant much in the national life.

The agora was an open meeting place, surrounded by colonnades, and here orators held forth and public business took place; it was, in fact, the Greek fore-runner of the famous Roman forum.

The stadion was a course for the running of foot races and the holding of other athletic events, and, like the Greek hippodromes for horse and chariot racing, it provided seats for the spectators and accommodations for the athletes. Nor can we think of these buildings as minor architectural incidents when we learn that the stadion at Athens seated between forty and fifty thousand people.

The palaestra, or gymnasia, such as those at Olympia and Ephesus, were equally important, and formed the Greek origin of the later great thermae or baths of the Romans. The Greek gymnasia had pools for the bathers, exercise courts, and seats for spectators of the athletic contests, and like the other buildings just mentioned, were a very important part of Greek life.

More than this, the remains of these buildings, so different from anything found in Egypt or in Asia Minor, illustrate the way in which architecture grows from the demands and needs of the peoples who produce it, how closely it expresses their civilization and, in later years, reveals it as clearly as a book.

If there were no other evidences in history we would know from the remains of these varied secular buildings of Greece that democracy had supplanted the despotic rule of kings and priesthood, that the Greeks were creators and lovers of the drama and of oratory, and that they admired physical strength, beauty and athletic prowess as much as they revered their gods.

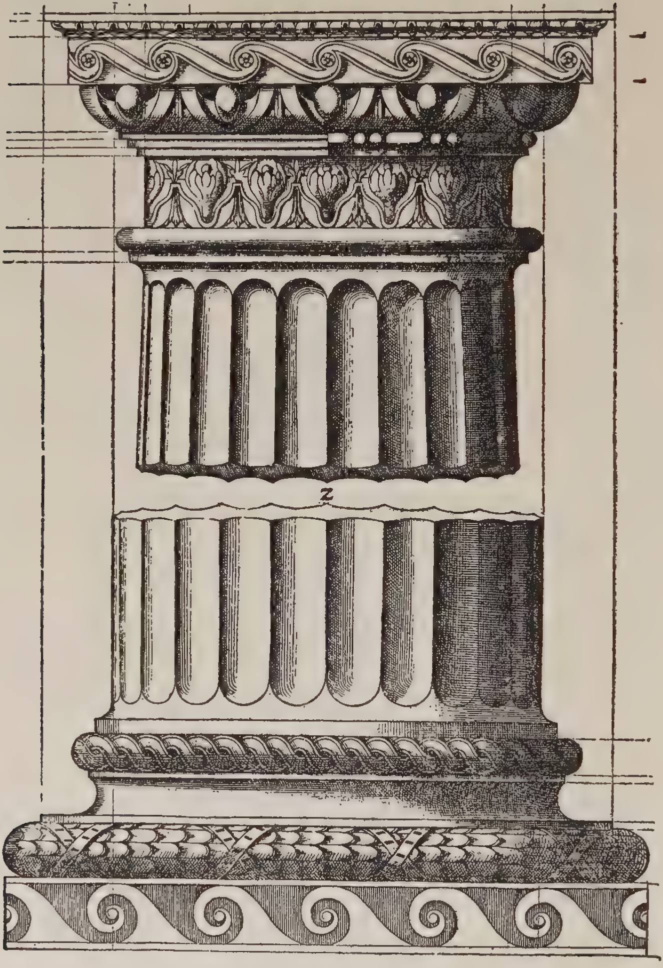


Figure 60
The fully developed type of Roman Doric column, with fluted shaft and profuse ornamentation.
(*See Figure* 50)

Imperial Rome and the Beginning of Modern Architecture

The story, now, is taken up by Rome, conqueror of the ancient world. Greek culture, architecture and art in every form were adapted by the Romans to suit their own purposes. Discarding the Greek Doric and Ionic Orders, they carried the Corinthian to its utmost development and devised two others—the Tuscan (Fig. 50) often called "Roman Doric" and the Composite (Fig. 56). And of all the designs for columns and entablature the Romans seemed most to favor the Corinthian.

In Roman architecture there is apparent a definite change from the buildings of antiquity to buildings more nearly like those of modern times. And having taken the column-and-lintel type of architecture from Greece, they lifted the arch from its obscurity into a place ranking in importance with the use of "orders." No more was the arch hidden in drains. It became glorified in the triumphal and memorial arches (Fig. 61), in its frequent use with columns, as in the Colisseum (Fig. 62) and in other Roman theatres (Fig. 63). And even in many of the "Barbarian" lands which fell under the sway of Rome, the arch carried great viaducts and aqueducts mile upon mile across the country. (Fig. 64). The Romans became master engineers and builders of the arch.

The function of any arch is to provide a means for spanning openings without the use of large stones, or

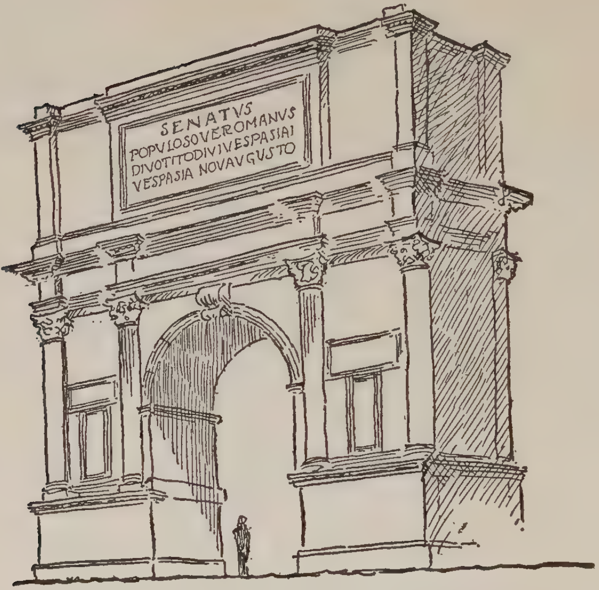


Figure 61
The Arch of Titus, typical of the triumphal and memorial arches built by the Romans.

the compromise of corbelling the stones, as in Figure 45.

The arch is built of a number of small stones, or bricks, called *voussoirs,* made to taper toward the center of the arch (Fig. 65), and held in place by a stone which is called the "Keystone." The arch thus constructed is capable not only of supporting itself, but of carrying great loads, and by the Romans it was used both for this purpose, structurally, and purely decoratively in connection with columnar architecture.

Sometimes the columns in a Roman building supported the weight, with arches built between for effect, and sometimes this scheme was reversed, with the arches bearing the weight, and the columns used for their decorative effect. It was this decorative use of columns that led to the popularity of the pilaster, which follows the style of the column in its design but is comparatively flat and projects but a few inches from the wall, of which it is a part.

Rome's greatest single contribution to architecture, undoubtedly, was the glorification of the arch, and the demonstration of its importance as a structural method and a feature in design.

Next to this, Roman architecture is important to us today because it developed even beyond Greek archi-

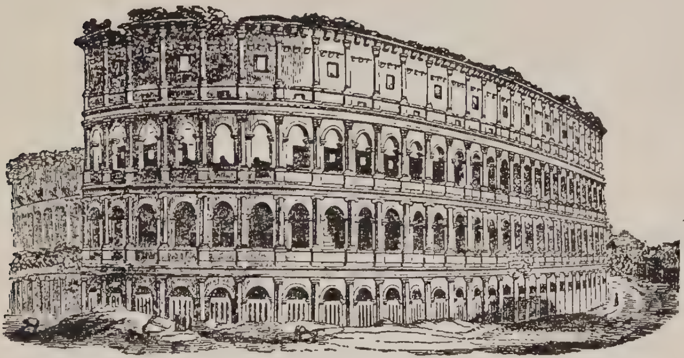


Figure 62

Ruins of the great Roman Colosseum, the theatre for gladiatorial exhibitions. In design and construction this far outclassed the ancient Greek theatres.

tecture the design of important public buildings similar to modern buildings, and because it inspired purely architectural planning of large buildings in imposing projects (Figs. 66 and 67)

The amphitheatres, the great *thermae* or baths, the triumphal and memorial arches, the buildings of the Forum—these are more typical of Rome, its life and civilization, than are its temples.

It was natural that the houses of private citizens of means should become more elaborate and luxurious. Their style followed the general scheme of the Greek private house, with its atrium, or open central court. The country houses of important Romans became known as "villas," as in later Renaissance Italy, and were often filled with works of art, mainly in the form of marble statuary brought over from Greece. The excavations at Pompeii, which was buried in ashes from an eruption of Vesuvius, have revealed most of the details of Roman houses, and Roman remains in general tell us that the principal architectural arts that were later brought to perfection in the Renaissance were practiced by the Romans. The Romans applied far more ornament to classic forms than Greek purity would have allowed, as may be seen in a group of Roman fragments, by the great engraver, Piranesi (Fig. 68).

Stone was the principal material, often figured marbles, and there was much carving in high relief. Stucco was frequently used as a finish, and the mural paintings in fresco on plaster found in many of the

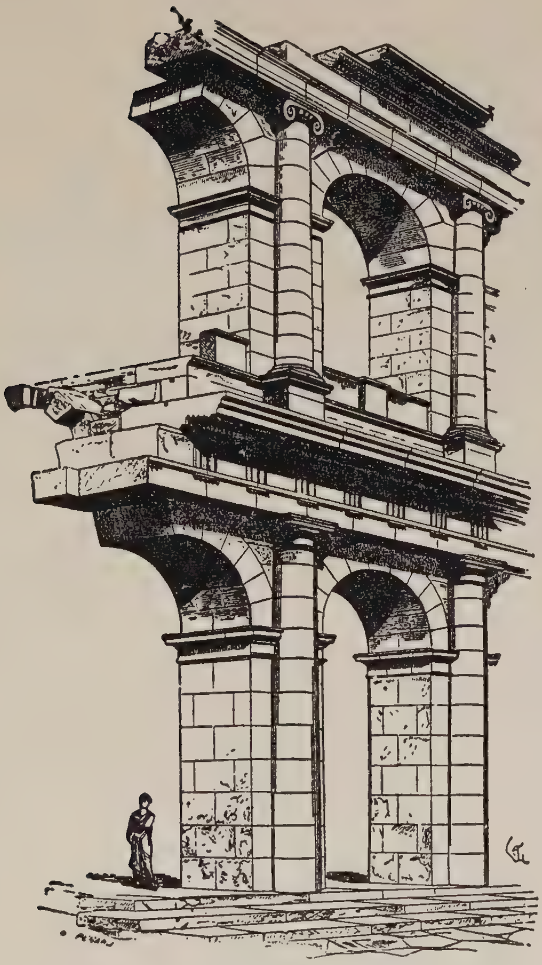


Figure 63
A fragment of the Theatre of Marcellus, showing the characteristic Roman use of column and arch, later very popular with the Renaissance designers.

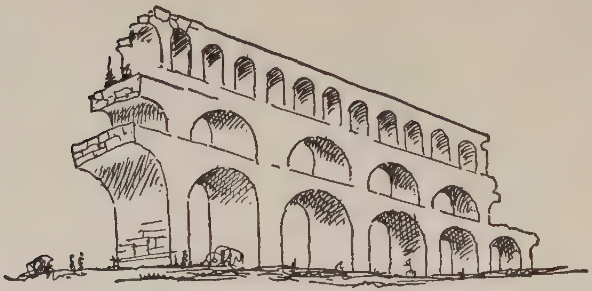


Figure 64
Remains of a Roman aqueduct, one of the most conspicuous uses of the arch characteristic of Roman architecture.

houses of Pompeii show a high development of that art, which is generally more closely associated with the Italian Renaissance. The Romans also developed mosaic work, which later became one of the principal

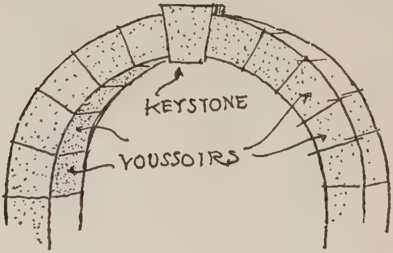


Figure 65
Construction of an arch in its simplest form. The Keystone holds the other stones, called "voussoirs" in place, and the whole will support great loads, if outward thrust at base of arch is provided for.

features of Byzantine buildings, and they also showed a consistent tendency to place permanent sculptured inscriptions on their buildings. This, it might be said in passing, is not done today nearly so much as it might be. A well-designed inscription, well worded and finely lettered, can be not only a dignified decoration but a bit of living history recorded in a permanent form, and an incident that would direct a wide general attention to the buildings we build today.

One of the most definite reasons why Roman architecture more nearly resembles the architecture of modern times is that Roman life, at the height of the Empire, more nearly approached the kind of life we live today. The civilization of Rome was, essentially, a modern one, and this fact expressed itself in many Roman buildings.

Rome built far more buildings for general public use than any nation had built before and the solutions of varied problems of design by the Roman architects were so thorough and so fine that they survived time and the fall of the Empire itself to reach us today through the even more modern Italian Renaissance.

From Greece we inherited a Classic purity of form that inspired several Classic Revivals and exists today as one of the greatest of all the basic elements of architecture. But it is from Rome that we inherit a more practical grasp of the relationship of noble architecture to the actual needs of more complex requirements. The Romans made a lasting demonstration that any building may be given a permanently fine architectural

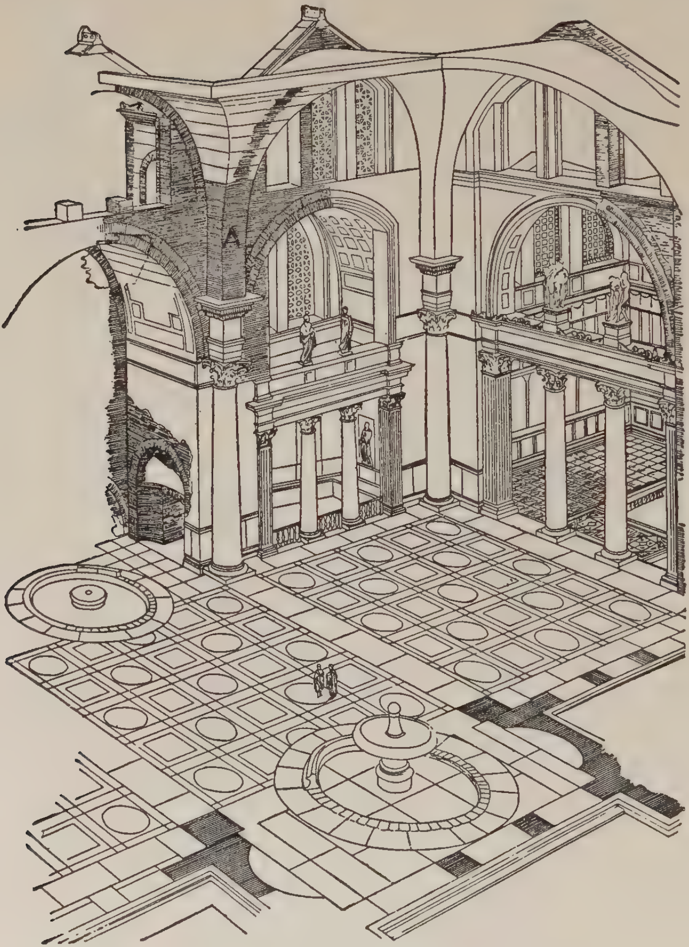


Figure 66
Modern planning seen in the Roman Baths of Caracolla.

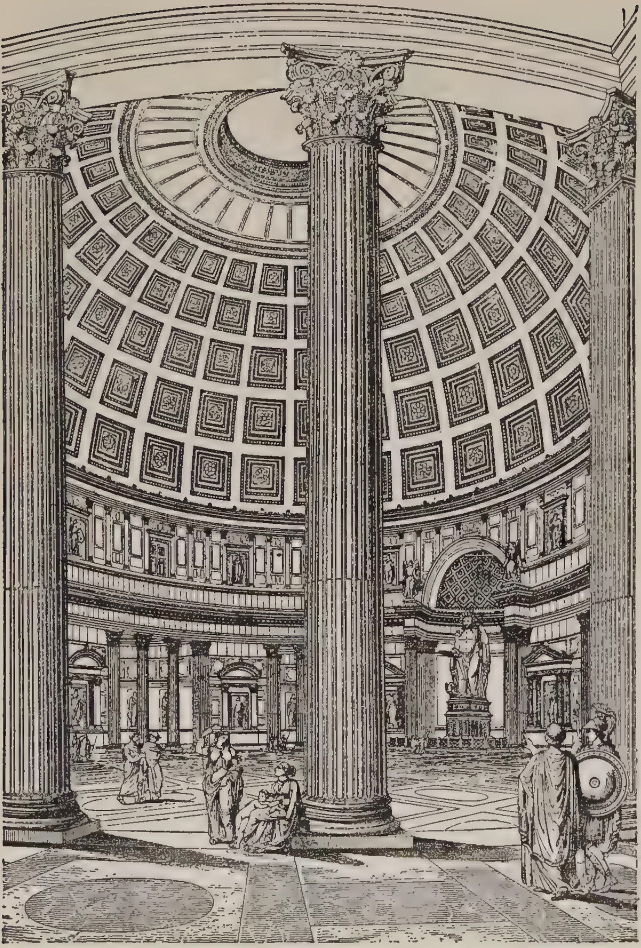


Figure 67
The Roman Pantheon might have been built during the later Renaissance.

character if it is designed in a fine and imposing manner.

The architects of Renaissance Italy were quick to realize this, and, taking Roman buildings they refined and humanized them to a degree so nearly meeting the requirements of today that the style of the Italian Renaissance may be seriously regarded as one of the living styles.

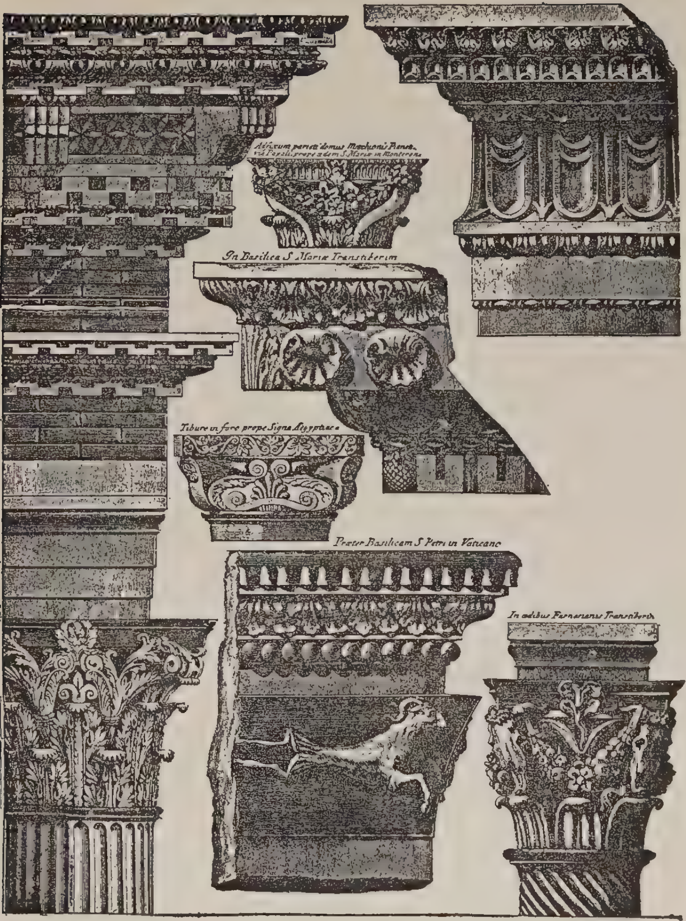

Adfixum pariete domus Marchionis Pianesi via Papali prope aedem S. Mariae in Monterone
In Basilica S. Mariae Transtiberim
Tibure in foro prope Signa Aegyptiaca
Praeter Basilicam S. Petri in Vaticano
In aedibus Farnesianis Transtiberim

Figure 68
The richness of Roman architectural decoration seen in a few "fragments," engraved by the great Renaissance etcher, Piranesi.

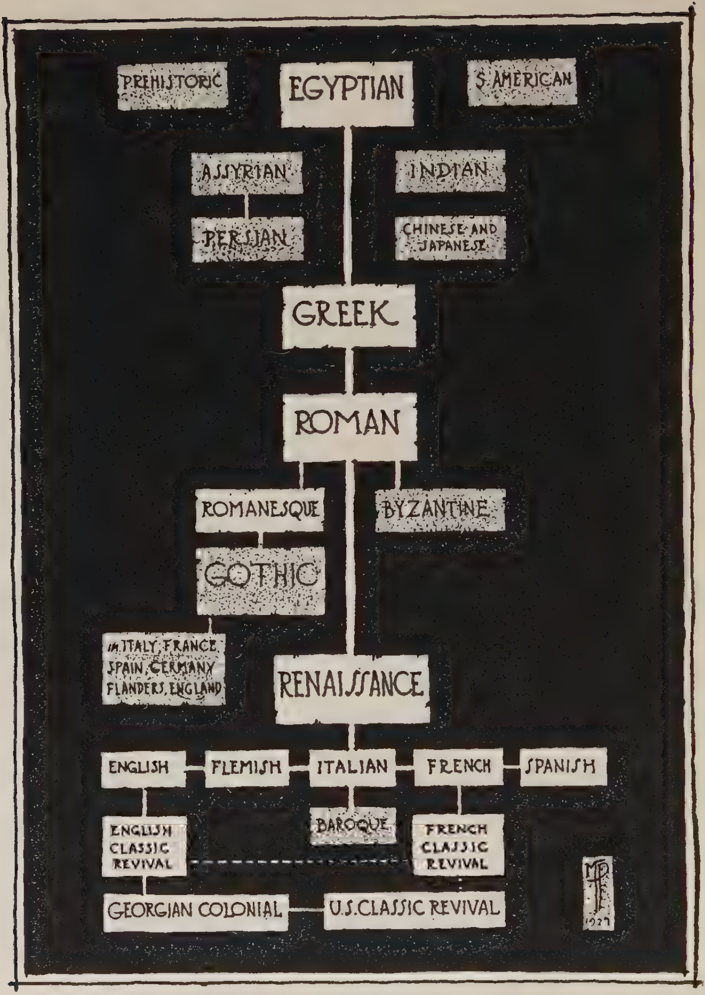


Figure 69
A diagram chart showing the course of architecture from the time of ancient Egypt to the Classic Revival in America. (The greyed panels show styles which grew and ended without continuing on toward the present.)

After the Fall of Rome Came Byzantine and Romanesque Architecture

It may be well at this stage of the story to make a diagram, because there are confusing off-shoots from the main architectural stem, and the course of evolution might become temporarily lost to sight.

So far the story has led from prehistoric or primitive building (really not architectural), to the great temples of Egypt, which is the first definite style at the top of the diagram (Fig. 69). At some early time—we do not know exactly when—an ancient race in Central America developed an extraordinary architecture, its origin still a riddle. But it had reached its highest point before the Spanish conquest, after which it perished, leaving no influence upon the architecture of today.

Similarly, origins lost in the mists of antiquity produced amazingly elaborate architectural styles in China, Japan and India—and these, too, remained in the countries of their origin, and had no influence on the main stem of architecture, any more than had that of Assyria, which affected only the arts of its Persian conquerors.

Turning again to the diagram, the main stem is seen to carry through from Egypt to Greece, and directly from Greece to Rome. But at this point its steady continuity is interrupted by the fall of the Roman Empire in 455 A. D.

Two architectural styles arose from the ruins of

Rome—Byzantine, so named because Byzantium, formerly the "Eastern Empire" of Rome, became an independent empire, and Italy itself, where the Romanesque style originated. It will be seen by the diagram that Romanesque architecture led directly to Gothic, but when Gothic had reached its highest possible development, its evolution stopped, and the inspiration of architecture went back to its main stem when the Renaissance revived Roman architecture. And the wide and lasting influence of the Renaissance we will duly reach as the story proceeds.

Returning to Italy, at the fall of the Roman Empire, a few dates may help as guide-posts in what is generally a little known period. Constantine became Emperor of Byzantium (founding Constantinople) in 300 A. D., and the power of this early Christian empire dominated Italy as well, until the rule of Gregory I, Bishop of Rome. There was a good deal of fighting, and it was not until 721 A. D. that Rome broke away from Byzantium, and the first Papal States were founded. Byzantium itself, after it lost Italy, survived until 1453, when it finally fell under Moslem rule.

Meanwhile Italy went through a long period of political and religious unrest. Christianity was getting its foothold, and there was much settling of conditions generally until about 1200 A. D., when several Italian cities, such as Venice, Genoa and Florence began to grow rich and powerful, mainly through trade and industry. It was upon this foundation, in another two centuries, that the great Renaissance began—but this

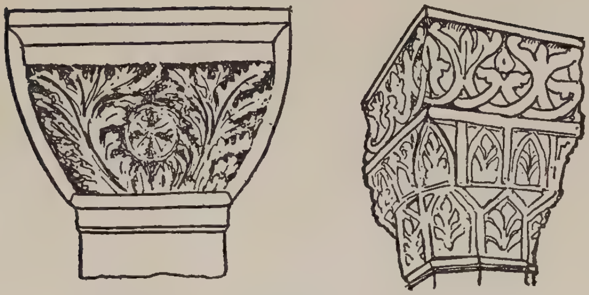


Figure 70
A comparison of Byzantine and Saracenic column capitals, showing their similarity in profile.

is ahead of our story, and we must go back, on the diagram, to the two styles that immediately followed the fall of Rome in 455 A. D.

Byzantine architecture shows a marked relationship to the architecture of the Eastern nations, not only in its use of the dome, but in its tendency to great elaboration of surfaces. A similarity, too, is noticeable in column capitals (Fig. 70).

And a very important change took place at this time in religious architecture: the old idea of a "temple," which was a dwelling place of the deity, gave place to the new idea of a "church" where the faithful came to pray and worship. Where priests performed rites to their gods in behalf of the people, they now acted as shepherds of a flock, and brought religion to the people in a more personal way.

With the strong distaste for anything belonging to the "pagan" Romans, the Christians, in evolving Byzantine architecture, paid little attention to the old Classic Orders, and built of brick, often used ornamentally (Fig. 71), and embellished with elaborate mosaics. They used arches structurally, usually springing them from short columns which were placed in pairs or clusters. The capitals of these were basket-shaped, and often in the same arcade no two were of the same design, though all were similar. The carved detail of these was often very intricate, with leaves, interlaced foliage and grotesque animals. The only opportunity in Byzantine architecture to gain what architects call a "large effect" was in the dome, which dominates the design of both the most important

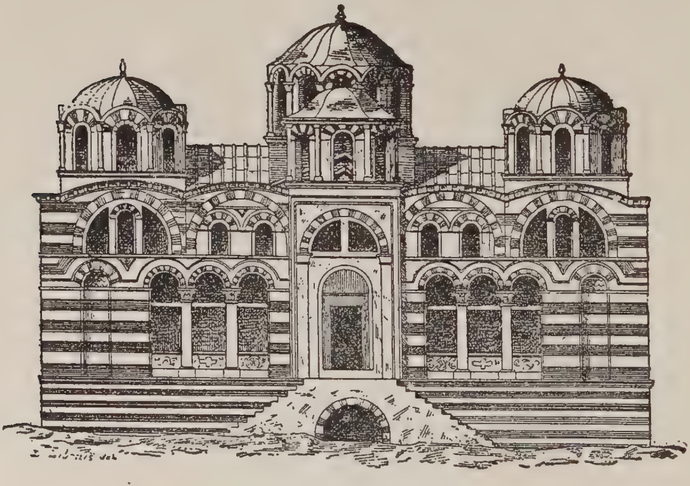


Figure 71
The decorative character of Byzantine architecture, seen in the façade of the Theotocos.

Byzantine churches in existence—the church of St. Mark, in Venice, and Santa Sophia in Constantinople. The latter church was built by the Byzantine Emperor Justinian in 532 A. D., but when that Empire fell to the Moslems Santa Sophia became a mosque, and has so remained ever since.

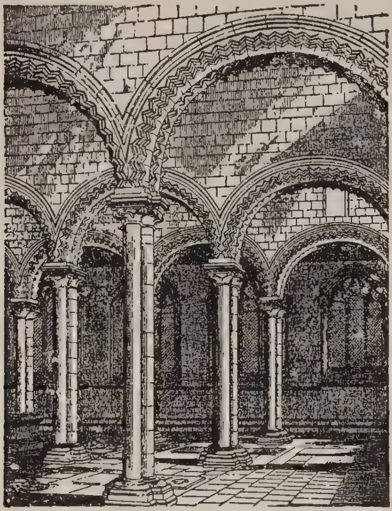


Figure 72
The Byzantine element in English Norman architecture, seen in a detail of St. Bartholomew's.

The Byzantine influence is found scattered through France, whence it reached England, where it is the real basis of what is called "Norman" architecture, as can be seen in Durham cathedral, St. Bartholomew's, and many other early English churches (Fig. 72).

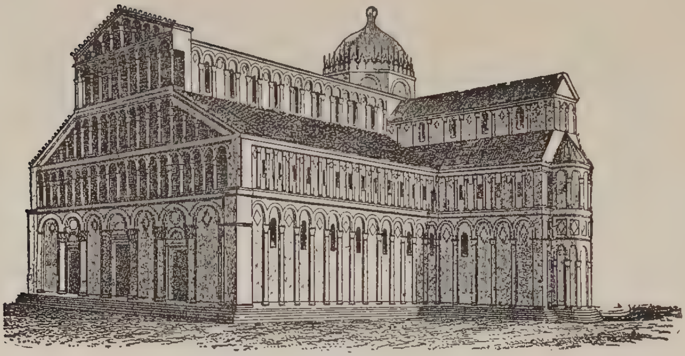


Figure 73
The Cathedral of Pisa is a characteristic example of Romanesque church-building.

There are several differences between Byzantine and Romanesque architecture, but the principal difference is the Romanesque development of vaulted roofs as contrasted with the Byzantine development of domes.

The columns and capitals in Romanesque architecture were far more like the Roman types than were any Byzantine columns and capitals—probably because in Italy the Roman remains on every hand made it hard for the builders to escape from the old Classic influence.

The Byzantine church plan was very compact as it naturally had to be, roofed with a dome, while the Romanesque plan was more like that of the later cathedrals (Fig. 73) with side aisles and a central nave that ended at the altar (the apse of later cathedral plans.) Romanesque was like Byzantine in that it was

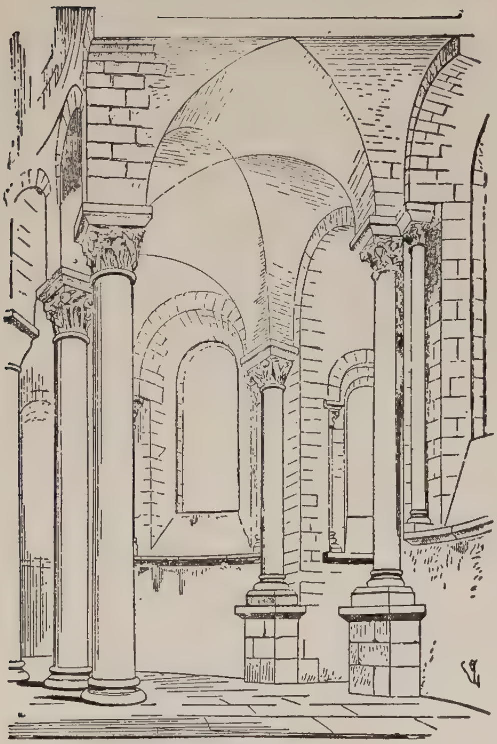
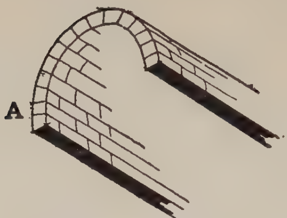


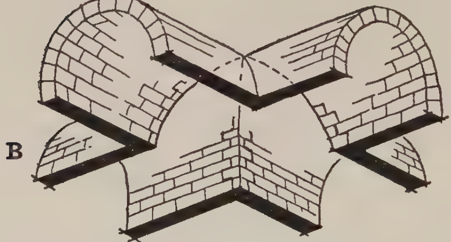
Figure 74

The groin vault that led to the discovery of the rib vaulting system of Gothic architecture is evident in this Romanesque church in France.

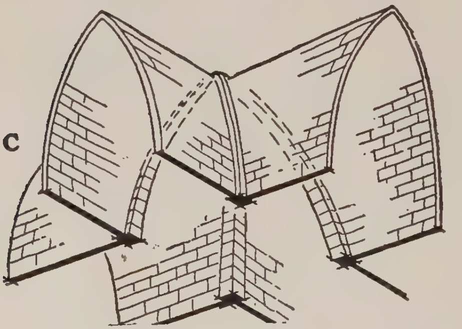
largely a brick architecture, but it was not so elaborately enriched. The heavy tile roofs were first supported on timber trusses, but as the Romanesque builders progressed they felt the need of supporting these heavy roofs on masonry vaults.



SINGLE BARREL VAULT



GROIN VAULT *formed by two* INTERSECTING BARREL VAULTS



(SIMPLE RIB VAULT . . . *the groin stones forming the ribs.*

Figure 75
The evolution that led to Gothic architecture through (A) the simple barrel vault, (B) the groin vault and (C) the discovery that the groin stones could be built as ribs.

It was this need that led directly to the discovery of the whole system of Gothic construction, which revolutionized architecture and dominated the creative imagination of the Western world for three centuries.

Figure 74 shows a bit of the interior of a Romanesque church built in France in the first half of the eleventh century, and already the similarity to the later Gothic church interiors is apparent. The columns are still close in their form to the old Classic Corinthian type, but now no entablature rests upon them. Arches spring from every one, and overhead can be seen the beginning of the Gothic vaulting idea.

There are a great many different kinds of vaults, "vault" being a general term meaning the roofing over of any space by means of small-stone masonry. A dome is one type of vault, and another is the barrel vault (Fig. 75A), which is arched from side to side of the space it roofs. A groin vault (Fig. 75B) is formed by two barrel vaults crossing each other, the square space thus formed being covered by the groin vaulted portion. The intersections of the vaults are the groins, and this form of vaulting was by no means uncommon in Roman architecture.

It was left to the Romanesque builders, however, to make the important discovery that the groins of a vault of this type are self-supporting, and that a heavy roof may be built on a system of masonry consisting entirely of groins, now to be called "ribs," since the filling in could be done with much lighter masonry. (Fig. 75C).

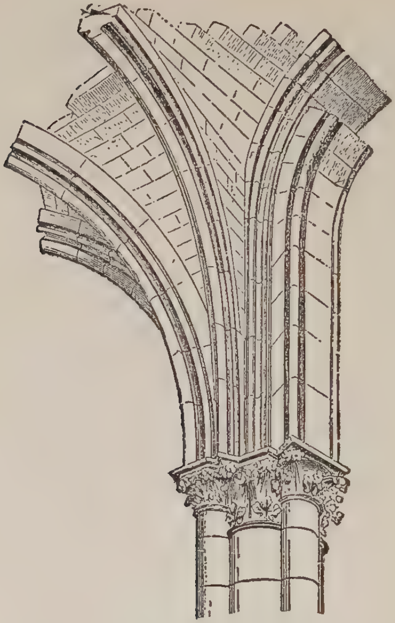


Figure 76
The many ribs of Gothic vaulting sprang from slender clustered columns, with capitals designed according too the number of ribs.

Gothic Architecture—a Marvellous Adventure in Construction

The story is here taken up by the Gothic builders (the name coming from the Goths of Germany), and the method of building became "rib-vaulting." It was soon found to involve several other problems of construction which had a direct effect on design.

As soon as it appeared that numbers of ribs could not spring from one column, the scheme of a number of small columns, clustered together was evolved. These clustered columns were often very tall and very slender, with small capitals, designed in an endless variety of foliage treatments (Fig. 76).

At the same time the Classic entablature disappeared, as there was no possible use for it, and with it the Classic use of mouldings, especially as used to compose cornices. The Gothic system of construction had nothing in common with the column-and-lintel type.

Up to this time arches had never been used as the principal structural factor in buildings, and now the physics involved in arched construction had to be reckoned with. Although the arch will carry great loads and will exert most of its pressure downward upon its supports, there is always a strong side-thrust which must be taken care of. If two columns are set up, and a lintel laid across them, the result is perfectly static. The lintel will remain in place indefinitely, unless removed by some force specially exerted to do so. But if an arch is sprung from one column to the other, the result is not static. The side-thrust of the arch at its base will push the two columns apart, and the arch will collapse between them. In a row of arches, each one will neutralize the thrust of its neighbor, but the two end arches must be given what is called an "abutment," or the whole arcade would collapse.

It was to meet this structural necessity that the Gothic builders devised the buttress, a heavy mass of

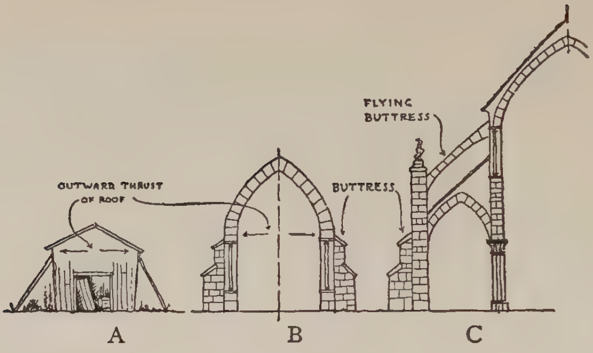


Figure 77
The principle of the buttress seen in the shoring-up of a shed about to collapse from the outward thrust of its roof.

masonry placed against the wall of the church opposite each arch. But the problem of arch thrusts was not so simple. In its simplest terms it can be compared with the expedient anyone would naturally employ if the roof of a shed threatened to collapse by pushing out the side walls. The comparison is a homely one, but helps to make the buttress idea simpler. Figure 77A shows the collapsing shed, against which one has braced timbers to take the side-thrust of the roof. In B, in the same figure, the shed is changed to a rib-vaulted church, but it is a church with no side aisles, so there is but one range of arches to be buttressed.

The Gothic churches and cathedrals, however, always had at least three ranges of arches to buttress, as shown in Figure 77C. There was the central nave, rising high above the side aisles, which were also arched. To offset the side-thrusts of both sets of arches, the Gothic builders heavily buttressed the side-aisle arches and carried the masonry up to receive an additional buttress, called a "flying buttress." This was made as light as possible, and so placed as to take the thrust of the arch directly to the pier of the main buttress. To surmount the piers with pinnacles was an obvious decorative device to make the whole exterior effect more pleasing. This simplest form of flying buttress is seen in Figure 77C, and a more elaborate system, in a section of a portion of the Cathedral of Notre Dame in Paris, is shown in Figure 78. Here there are two side aisles, one of them two stories in height. A massive buttress pier takes care of both sets of lower arches and receives a flying buttress from the upper aisle, or gallery arch, and, above this, four flying buttresses that support the other walls of the building carry the thrust of the great nave arches out to the buttress pier. To say that the flying buttresses take the thrust of the arches they support is not exactly descriptive, because their weight, leaning against the outer wall of the building, acts very much like the timber bracing for the collapsing shed shown in Figure 77A. There is, in fact, an opposition of forces that makes for a safe balance, or the great cathedrals could never have been built.

A section through Notre Dame (Fig. 79) further explains this buttress system, as well as the principal facts of the whole vaulting system. In the center, the great nave rises to the full height, its rib vaulting rest-

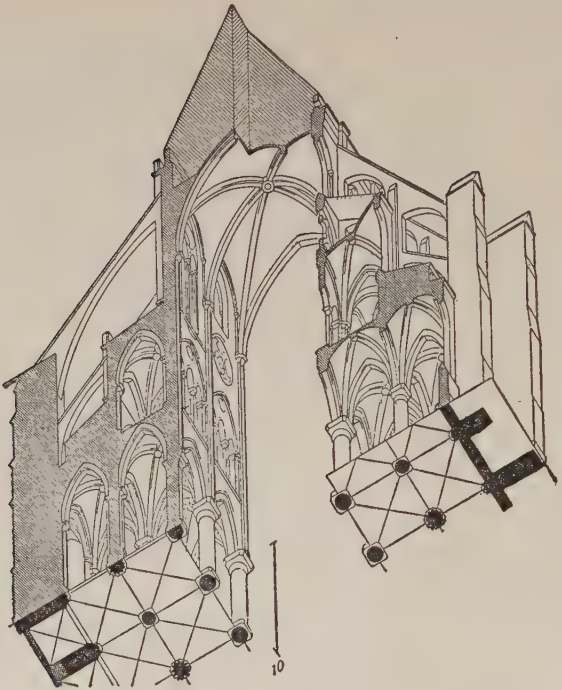


Figure 78
A projected section of Notre Dame Cathedral, showing the whole system of Gothic vault construction.

ing on tall, slender columns that spring from the heavier piers below. Above the two side-aisles there is the traceried gallery, and above this the clerestory windows, and all the vaulting is seen to be braced by the system of buttresses outside. This illustration, in fact, is a remarkably good picture of the whole Gothic scheme of construction. There were, of course, count-

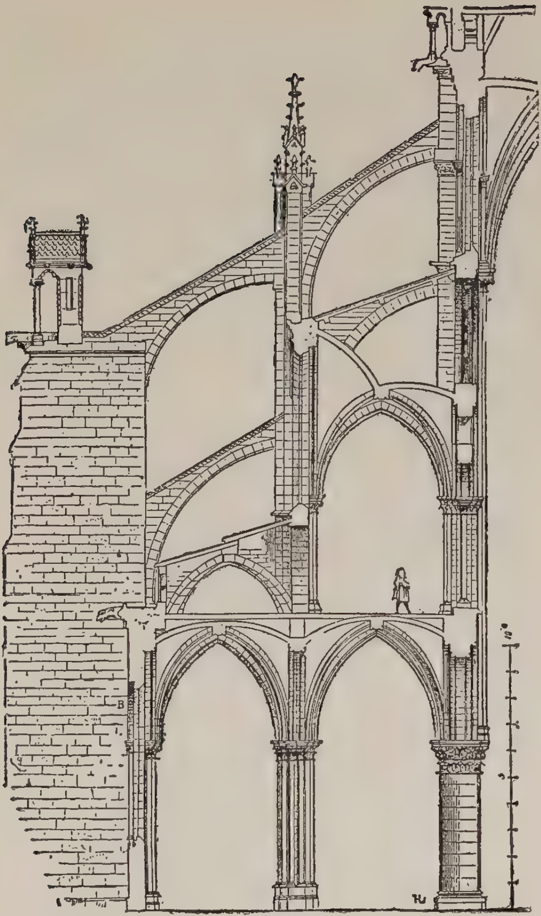


Figure 79

A section of a portion of Notre Dame Cathedral, showing the system of buttresses and flying buttresses.

less variations, but this shows the principle of Gothic architecture.

It is safe to say that the mind of men had never conceived a more brilliant, daring or intricate system of masonry building. The Egyptians, in comparison, were as children playing with building blocks. Here, in the great Gothic cathedrals, were arches upon arches, mounting ever upward, carrying great loads upon intricate webs of vaulting. And all the great fabric of masonry was elaborated with tracery, with carving of foliage, figures of saints, angels and grotesques, with finials and pinnacles. An added glory was the stained glass brought to perfection in this period. Much distance has already been traversed since the rude dolmen of Figure 35.

It would be impossible, here, to go into details of specific Gothic cathedrals and churches in the various countries in which the Gothic idea took root. Everyone knows that the greatest number of the finest examples, such as Rouen, Chartres, Amiens, and Rheims are in France, where the style reached its highest development. In England, building on the earlier Norman churches of Byzantine origin, rose many of the most important of Gothic cathedrals and churches, and it was in England that "fan vaulting" was perfected—a system which explains itself in all its fantastic beauty in Figure 84. In Spain there were many variations, with Burgos, perhaps, the most important, and in Germany the cathedrals of Strassburg (Fig. 80), Ratisbon and Cologne are perhaps the finest, and

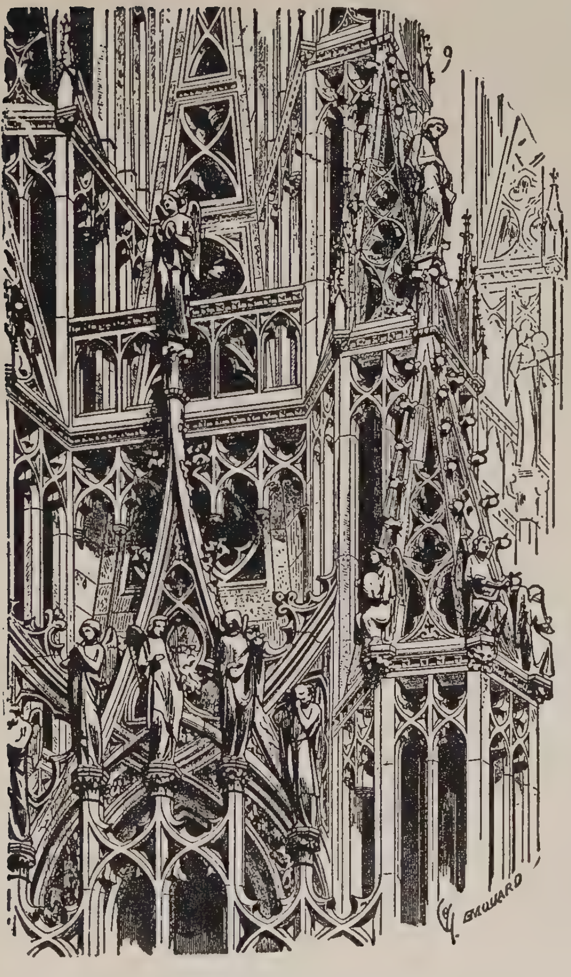


Figure 80
The intricacy and profusion of Gothic architecture as seen in a glimpse of Strassburg Cathedral.

among the really great Gothic buildings of the world. It is a curious fact that in Italy, which, though its Romanesque evolution had really started the whole Gothic system, the style was never very popular or very extensively used. That the Italians of the period did not lack the skill or imagination in Gothic building is amply evidenced in the Cathedral of Milan, which is undoubtedly the most elaborate, almost incredibly elaborate Gothic building in the world. The fact is that traditions of the great Classic builders of antiquity were too strong, too constantly present in Italy to allow

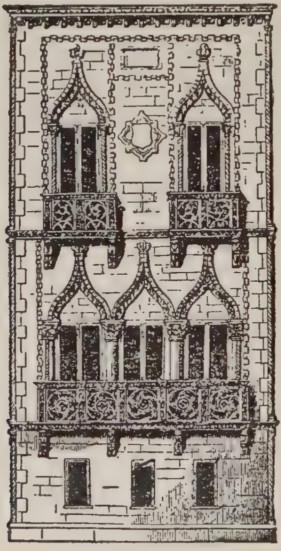


Figure 81

A typical Italian use of the Gothic manner in the façade of a town house, with original Gothic arches and traceried balconies.

architectural thought to ignore them as completely as the Gothic idea ignores them.

The most interesting expression of Gothic architecture in Italy was its secular use in many of the town houses, or *palazzi* of Florence and Venice. Figure 82 shows a typical house-front in this style, with traceried balconies and the double-curved Gothic arches which are called "ogival" arches. The Doges Palace and the Palazzo ca d'Oro in Venice are of this type, which is particularly characteristic of Italy.

It is well to remember that all Gothic architecture was not confined to religious buildings, though these employed the greatest number of available skilled artisans most of the time. The style was essentially one of craftsmanship, and evolved the "half-timber" type of construction which resulted in many picturesque old houses in France, England and Germany. Like all Gothic architecture, its structural facts led directly to its decorative treatment. The Gothic artisans were marvellous wood-workers, and their elaborate but vigorous wood enriched the cathedrals with choir-stalls and rood-screens (the screen across the chancel) with wood carving that has never since been excelled. When these same craftsmen-builders came to construct houses, they erected sturdy frames of wood, in the manner shown in Figure 83, carving many of the exposed portions. The frame was then filled in with brick-work or stone masonry and given a surface of stucco. The filling is known as "nogging," and the half-timber house is one of the most interesting and picturesque in the world.

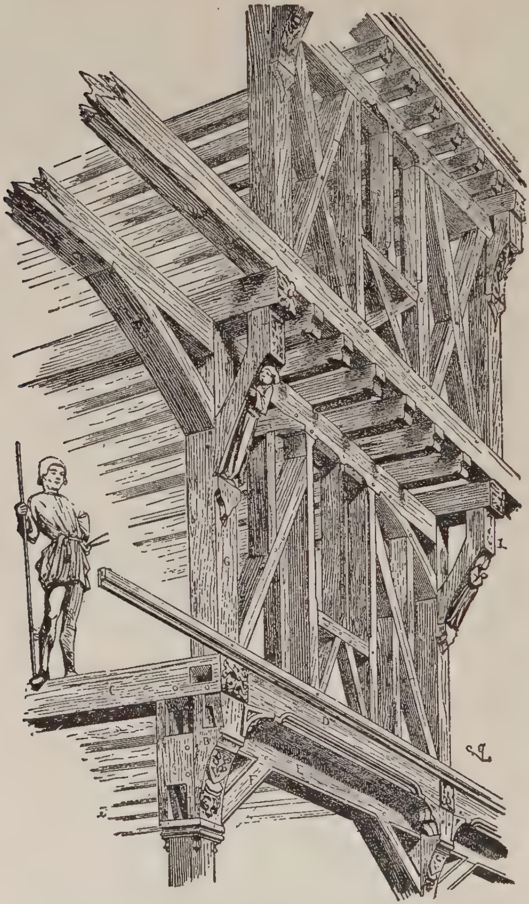


Figure 82
The construction of a French Gothic half-timber house, shown in skeleton form.

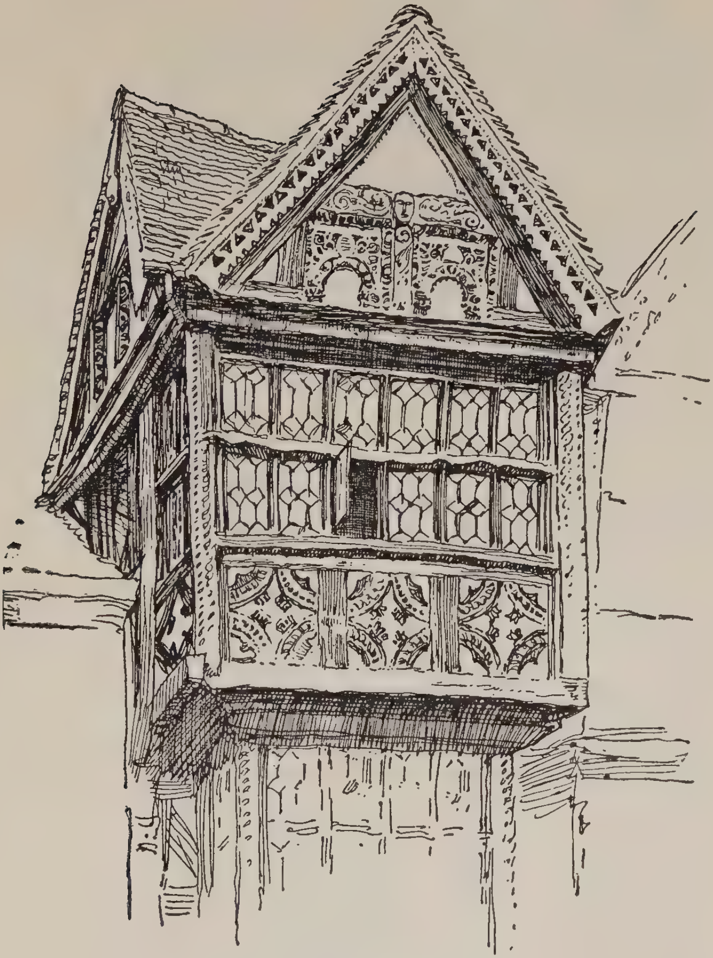


Figure 83
An English half-timber house, characteristic of the English manner of adapting this old Gothic type.

Though "half-timber" usually suggests England (Fig. 83) this method of building originated in France in the Middle Ages. The old method is still used by architects, when the high cost of labor involved in the necessary craftsmanship allows its use.

Before the subject of Gothic architecture gives way to the story of the Renaissance, a word should be said about that peculiarly characteristic Gothic detail the grotesque. There seems to be some confusion as to the difference between "grotesques" and gargoyles," but the distinction is a simple one. The gargoyle is always a water-spout, designed to throw the water from roof or parapet clear of the side of the building. It was treated in a grotesque manner, usually in the form of a fantastic animal or bird, or with a distorted human semblance. Gothic grotesques are even more common than gargoyles, and simply mean any detail, such as a bracket, a column capital or whatnot, of which the motive is a grotesque bird, animal, human figure or face. On the great cathedral of Notre Dame are both grotesques and gargoyles in profusion, as well as those weird stone figures called "chimeras" that lean over the parapets of the tower, peering down upon the city of Paris below.

As a final word on Gothic architecture, there is this to be said: intricate as it appears, it is simple enough in principle, and very easy to understand. No one can be baffled by the most elaborate Gothic cathedral if he separates it at once into structure and ornament, if he sees first the system on which it is built—its rib-vault-

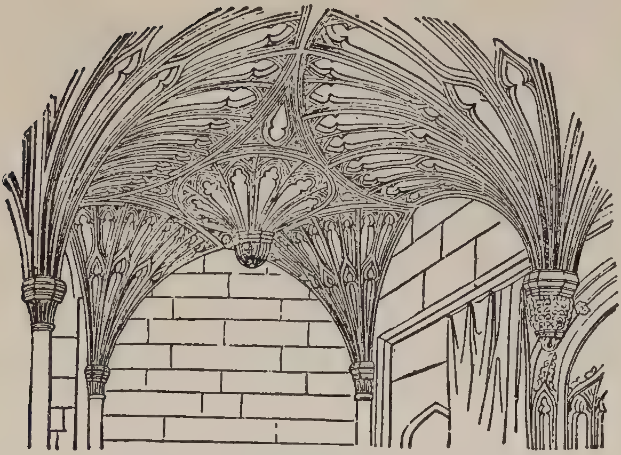


Figure 84
Fan-vaulting—a development of Gothic construction seen at its best in England.

ing and buttressing. There is no confusion, then, in enjoying the myriad details of carving and following all the Gothic builder's fantasies in stone and wood.

Gothic architecture has been called an "organic" style, in that it represents as logical a growth-system as a tree, and the term is a good one to think of. No other style in the world, perhaps, could be so rightly called organic, or could suggest through both its structure and its ornamental detail so much vigor and vitality. These qualities, too, were aided by the close relationship of the workmen to the building. Stonecarvers, for instance, were able to improvise much of their work as they went along with it, and as machine-made building materials had not yet been imagined, the element of hand-craftsmanship had free play.

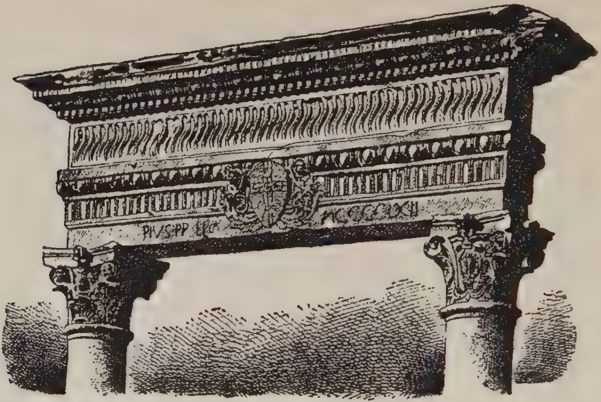


Figure 85
Italian Renaissance manner of treating the Classic type of column and entablature.

THE GREAT ITALIAN RENAISSANCE AND ITS RESULTS

THE TRANSITION FROM ANCIENT TO MODERN CULTURE

Although the Italians were largely the creators of Gothic architecture, through their Romanesque experiments, they never carried it out as a style with any real enthusiasm. The immortal remains of ancient Rome were too much in evidence on every hand, and in 1400, nearly a thousand years after the fall of Rome came the Renaissance. Literally translated, this means "re-birth"—but it was more than this. It has also been called the era of "The New Learning."

In brief, the Renaissance was the natural reaction from the Middle Ages, through which knowledge and power had been confined largely to the churchmen, who dominated politics, art, architecture, and every other human activity. Now men began to think for themselves and began to feel a keen curiosity about everything in the world. They felt, to begin with, that the ancients of Greece and Rome had a wealth of art, science, philosophy, drama and literature far too valuable to be allowed to lie buried any longer, and they set about reviving as much of it as they could. An intense admiration for all the arts and accomplishments of classic antiquity set in, and architecture, of course, at once began to show a direct Roman influence.

It was a great period, not only because of the actual works of art of every kind that were produced, but because it was the period of transition from ancient times to times that we call, by comparison, modern. This table of dates gives a fair impression of the activity in several parts of Italy, and shows the duration of the entire period:

Early Renaissance,	Florentine	1400—1600
	Milanese	1400—1600
	Venetian	1490—1600
	Roman	1444—1643
High Renaissance		1500—1540
Late Renaissance		1540—1643

During these years many discoveries were made: a New World was found by the adventurous caravels of Columbus, where ancient maps showed that no land could be. Experimenters in the sciences were able to

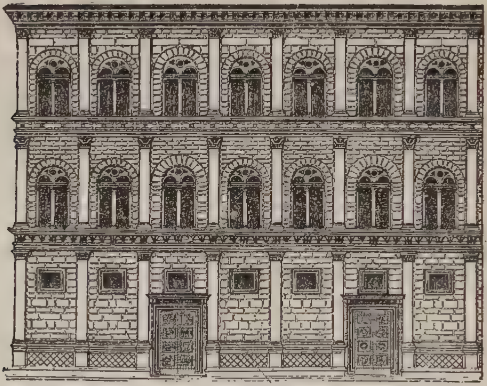


Figure 86
Palazzo Rucellai, Florence—typical of the Italian town house of the Renaissance.

pursue their investigations in all directions without so much fear as they had in the Middle Ages of being burned as accomplices of the Evil One. The appetite for knowledge in every form became so tremendous that the churchmen, who had long managed to keep a monopoly of what little knowledge existed, realized that neither threats of hell nor realities of immediate punishment could cope with the inspiration of the New Learning.

The human spirit had been released from bondage, and the great vitality that came with the release spread all over Europe and has survived as one of the principal elements of modern art and architecture today.

In Italy it was an age of great architects—Palladio, Vitruvius, Peruzzi, Bramante, Vignola—an age of considerable wealth that built sumptuous private palaces in the cities and luxurious villas in the country (Figs. 86 and 87). Architecture was no longer confined to church building, though many great churches were built, and the turn of men's minds to things worldly is found thoroughly reflected in Italian Renaissance architecture.

In character it drew entirely upon Roman remains, but refined and modernized these to a remarkable degree. The combination of column and arch occurs all through Italian Renaissance architecture either in the Roman manner (Fig. 63), or with the arches springing from the columns (Fig. 89). Groin vaults were often built, and also domes, and the almost flat tile

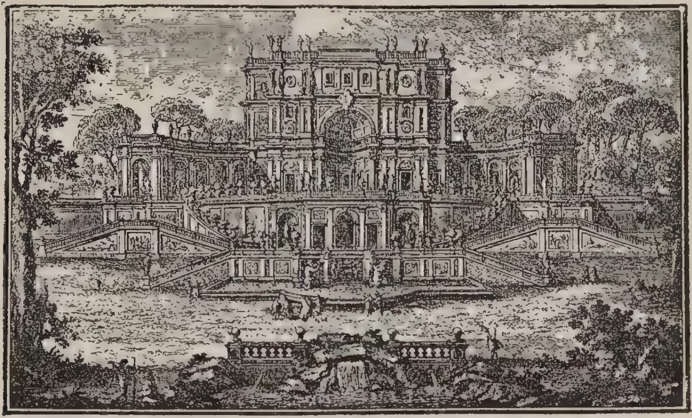


Figure 87

A late Renaissance villa in the country showing, especially in its garden, characteristics of the Baroque.

roof of the Italian villas and palaces is characteristic.

From the Classic Orders the Italian Renaissance architects selected the Corinthian and the Roman Doric, or Tuscan as their favorites, and developed both, especially the Corinthian order, in varied forms, and constantly as pilasters. The pilaster is a flat version of a column (Fig. 88), having no structural purpose, and of use mainly decoratively, to diversify expanses of wall. Renaissance pilasters were fluted, or treated with a sunk panel filled with formal ornament in relief, and the designers of the period worked out an endless variety of forms.

An important thing to recognize in Italian Renaissance architecture is the fact that the architects, although they were master builders, were not nearly

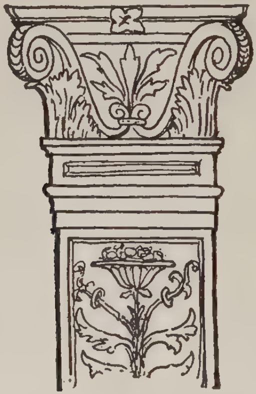


Figure 88

A favorite Renaissance treatment of the pilaster consisted of treating its shaft with a sunk ornamental panel, instead of flutes.

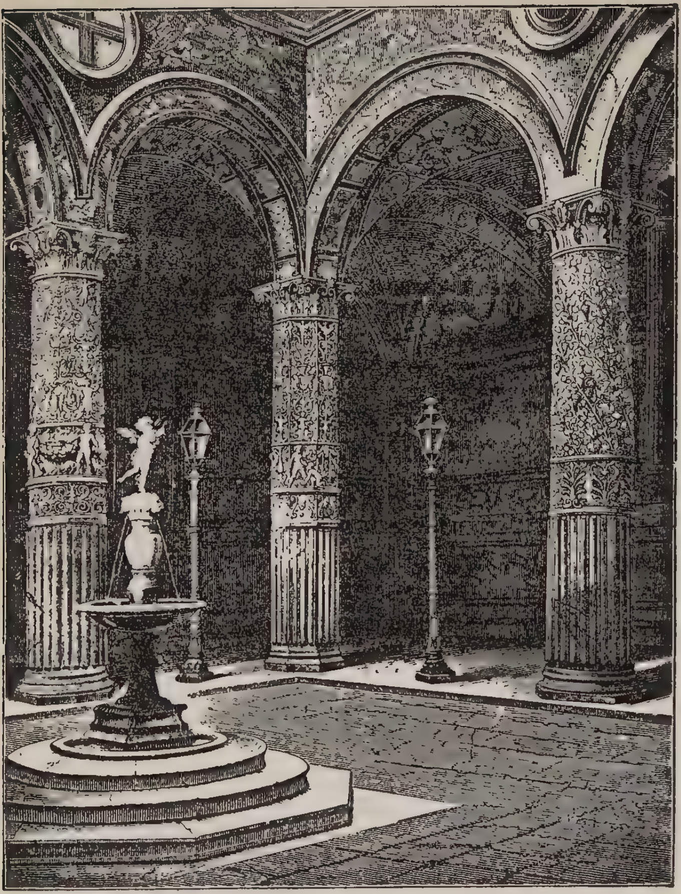


Figure 89

In the courtyard of the Palazzo Vecchio, Florence, the arches are sprung from richly decorated columns of varied design.

so interested in structural problems or large effects as they were in detailed design and decoration. Hence the enormous variety of decorative mouldings, cornices, columns and pilaster capitals, panels, brackets and other details. Hence, also, their invention and use of two types of surface decoration, *sgraffito* and *fresco buono*—both sufficiently interesting to merit a few paragraphs of explanation.

Sgraffito was done with two coats of plaster or stucco. The first coat was mixed with burnt umber (a brown earth mineral pigment), or with black ashes, to give it color. Over this a finish coat of lighter color was applied, and the intricate patterns were cut through this finish coat while it was still wet, so that a decorative effect was produced that was an integral part of the wall.

Fresco buono, or "true fresco" differs from mere surface painting on plaster in that it was done with special mineral pigments, all of such a chemical nature as to blend with the plaster while it was still wet. When the plaster hardened, therefore, the painting was an actual part of it, and could never flake off, as surface painting on plaster, outdoors, is very likely to do.

It is easy to see that either process could be done only by men who were as much artists as they were artisans, for both sgraffito and fresco mean quick and skilful drawing, before the plaster hardens, and practical experience as a plasterer as well. Both processes are almost lost arts today, and there are but few men capable of practicing them at all.

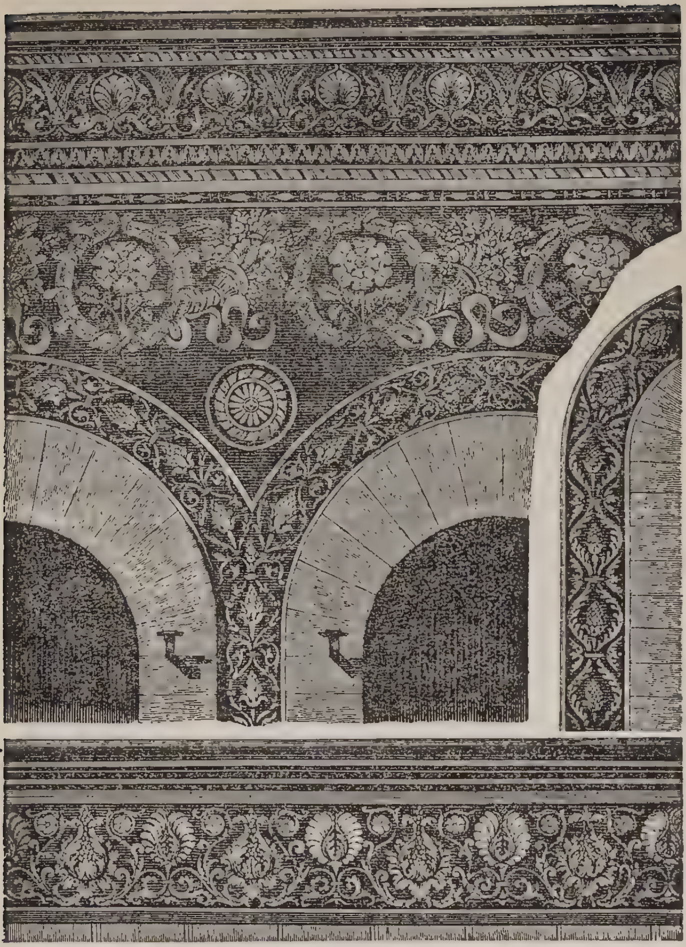


Figure 90
A portion of a façade in Florence, decorated with the colored plaster treatment called sgraffito.

Figure 90 shows a portion of the sgraffito decoration of a palace in Florence and Figure 91 shows the famous frescoed ceiling of the Sistine Chapel, by Michelangelo executed from 1508 to 1512. An interesting detail of both sgraffito and fresco is the ingenuity with which the Renaissance artist-artisans and architects combined flat decoration in either process with actual mouldings and other architectural forms.

Architecture, during this brilliant period of the Renaissance was but one of the arts that developed to such high degree of attainment as to make a priceless legacy for all time, to which the world is heir today and will be far into the future. Paintings, sculpture, furniture, metalcraft and weaving all reached splendid heights in the hands of artists whose names are immortal.

Certain points in Renaissance architecture are particularly important: its remarkable development of ornamental detail, apparently inexhaustible in its variety of treatment, its skilful use of this ornamental detail and above all its fine expression of good proportion and good scale. This is well illustrated in the drawing of a mantel in the Doges Palace, in Venice (Fig. 93) and in the typical Renaissance cornices shown in Figure 92. (See also Figs. 94 and 95.)

We have studied the matter of scale in *drawing* in Part I. Scale in *design* is a more subtle matter, and means the most beautiful and harmonious relationship of the parts of a building to its whole mass, and the most beautiful and harmonious relationship of every detailed part with every other part. If a moulding or a

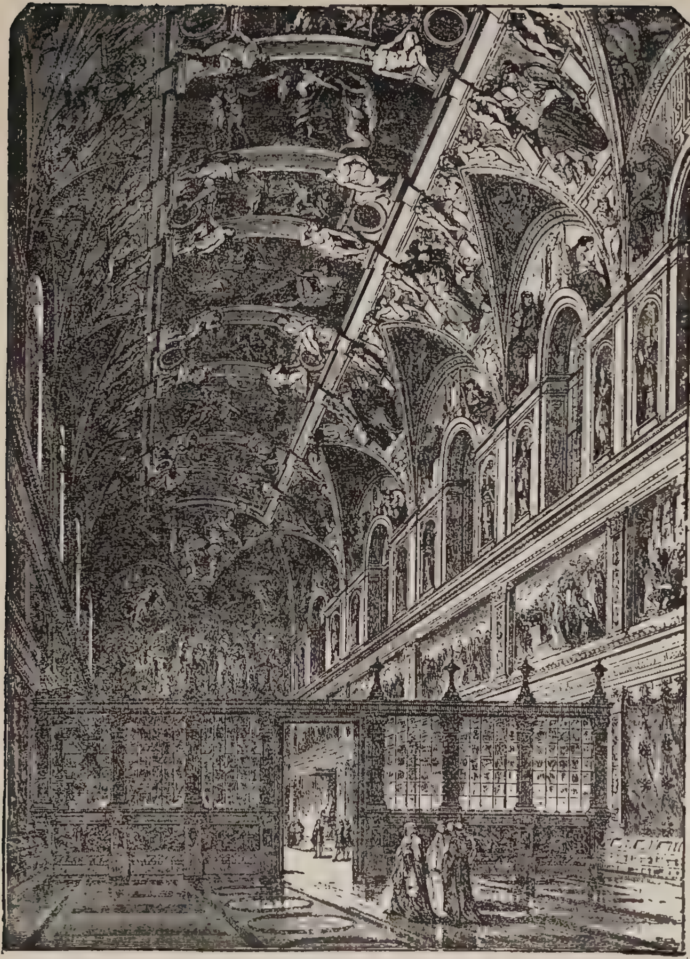


Figure 91
Fresco buono *decoration of the famous ceiling of the Sistine Chapel, painted by Michelangelo.*

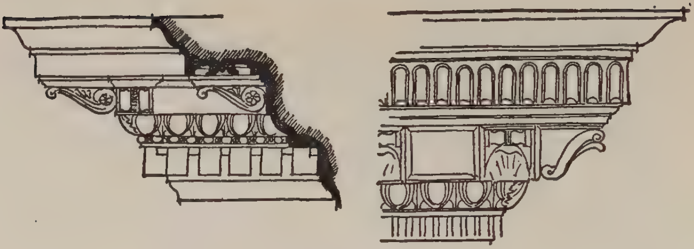


Figure 92
Two characteristic Italian Renaissance cornices, showing general variations from Classic Greek forms.

decorative panel is too small or too large for its place in the design, an architect says it is "out of scale." And it may as well be said at this point that there is no more definite difference between good and poor architecture than the difference between good and poor *scale*. Scale is one of the first points considered by any competent critic in judging the merits of any architectural design, whatever the type of building.

Of the part played by the Renaissance in the architecture of today, more will be said in a later chapter; for the moment it is more important to follow the great style northward over the Alps, to see what effect it had in France, Spain, Flanders, Germany and England.

It found France thoroughly Gothic, but made so strong an appeal that an interesting "transitional" style at once began, in which Gothic and Renaissance forms were freely mingled. Buildings of Gothic structure had pilasters, arches, pediments, balustrades and other

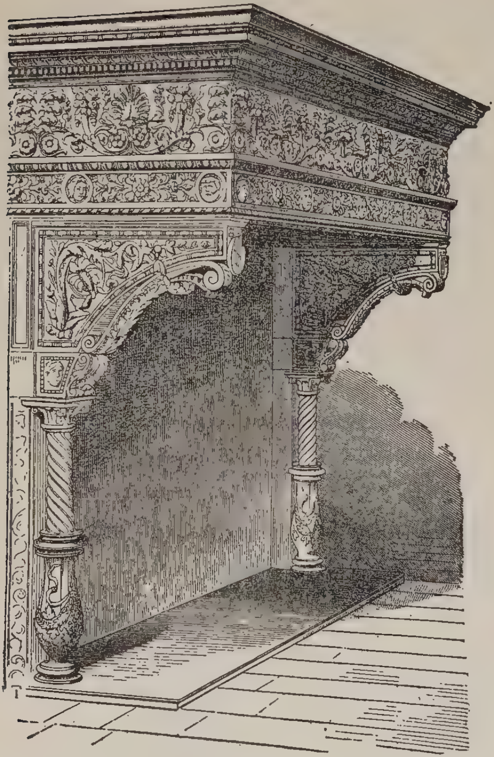


Figure 93
This mantel from the Doge's Palace, in Venice, is an excellent illustration of the beautiful scale in Italian Renaissance architecture.

distinctly Renaissance forms, or a building of the less intricate Renaissance type had pointed and traceried windows, Gothic mouldings and other features of the architecture of the middle ages. This transitional style was at its best under Francis I of France (1515-

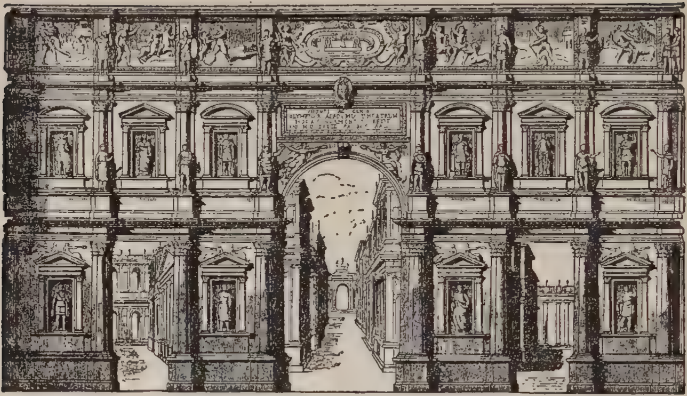


Figure 94
Much of the whole character of Italian Renaissance architecture is seen in this fanciful composition by the great Palladio.

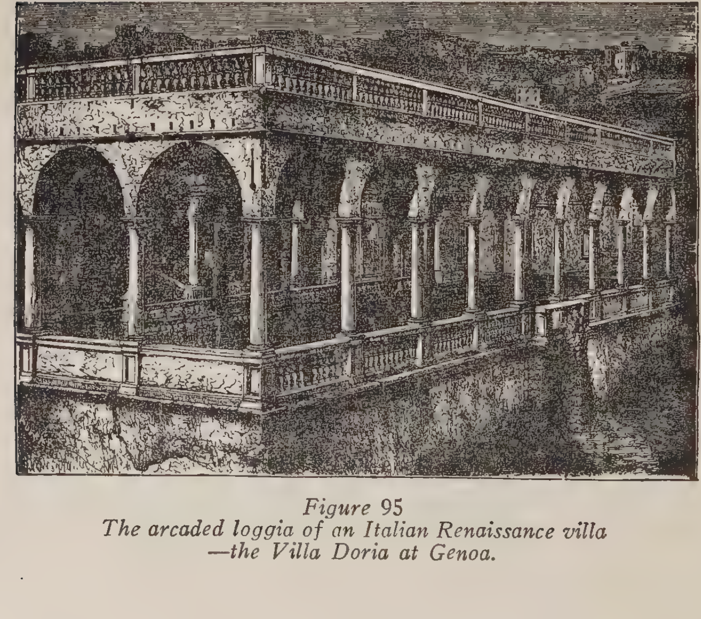


Figure 95
The arcaded loggia of an Italian Renaissance villa —the Villa Doria at Genoa.

1547) and is often called the "François Premier" style. Many of the great chateaux and castles built during the Middle Ages were remodelled in the new Renaissance manner, and gradually Gothic forms gave way to the newer style from Italy and developed toward the refined classic style of Louis XVI. A Gothic-Renaissance capital and pilaster are shown in Figure 97.

Architecture in Spain has always been unusual and different, in many respects, from the architecture of the rest of Europe, because of the strong influence of the Moors, especially in the southern part and because of the comparative isolation of Spain behind the barrier of the Pyrenees. This was true even of the Spanish versions of the Gothic architecture, and yet more true of the Renaissance.

Figure 96 shows the façade of the *Casa de las Muertes* in Salamanca, a thoroughly typical example of Spanish Renaissance architecture. It will be seen that such details as windows and balconies were intricately enriched with ornament. The windows were often fitted with elaborate iron grilles, and the doors studded with heavy ornamental bosses of iron. As in France, a Gothic feeling, and many definitely Gothic forms were blended with the forms that came from Renaissance Italy.

Through France the Renaissance reached Flanders, the "Low Countries" of Holland and the Netherlands, and here it developed into rich and intricate forms, of which one of the most characteristic is seen in both architecture and furniture. This was the caryatid pilaster, of which the upper portion consisted of a semigrotesque human figure, male and female, growing out of a tapered pedestal (Fig. 97). With all its intricacy of carved detail, Flemish Renaissance tended toward being a little heavy and ornate, which could also be said of the style as it was interpreted in Germany.

Last of all, the ever-widening influence that started in Italy in 1400 reached England, finding Queen Elizabeth on the throne (1558-1603) and the country enjoying a degree of prosperity that meant the building of many large and important country houses. The Elizabethan style, then, is, in fact, English Renaissance, which was preceded by the transitional style called Tudor. As in the other European countries, this transitional style kept many of the characteristics of Gothic architecture, especially the low, pointed arch, with its "label" mouldings. The style in which many of the old colleges of Oxford and Cambridge were built was of this period.

Gradually the Gothic forms disappeared from English architecture, and a definite Renaissance style became established. As in the Flemish Renaissance, the half-human pilasters were much used, and various other forms even more Italian became identified with English architecture. The influence was furthered by the importation of many designers and artisans from Italy, who gave the English Renaissance under Elizabeth a definite style, shown in Figure 98.

This carried through the Jacobean period and up to the time of William and Mary and Queen Anne, when the nationality of these sovereigns of the House

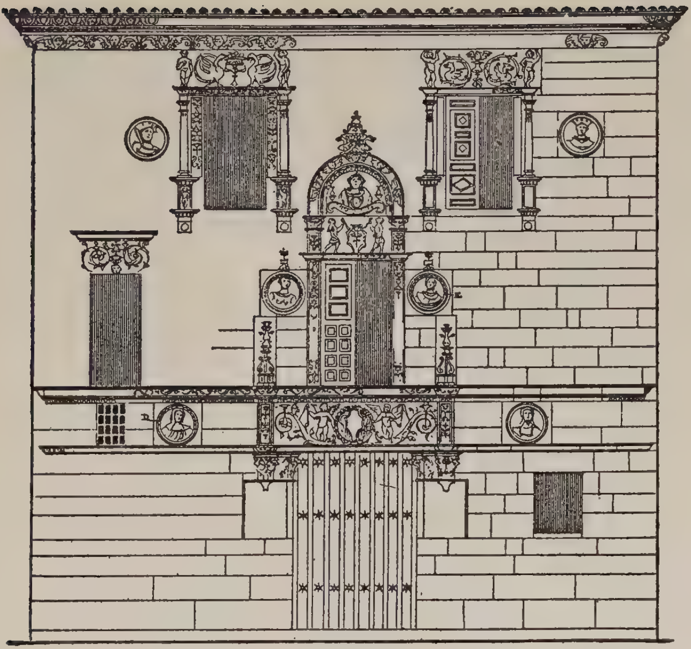


Figure 96
This drawing of the Casa de las Muertes, in Salamanca, illustrates all the principal characteristics of Spanish Renaissance architecture.

of Orange gave architecture and furniture a thoroughly Dutch character. And Holland had been developing the Renaissance into a style more nationally its own.

France, meanwhile, had been evolving a Renaissance style of its own out of the transitional Gothic Renaissance style of Francis I, until, under Louis XIV (1643-1715) all traces of Gothic had vanished, and the formal French-Classic style as practiced by Mansart, the

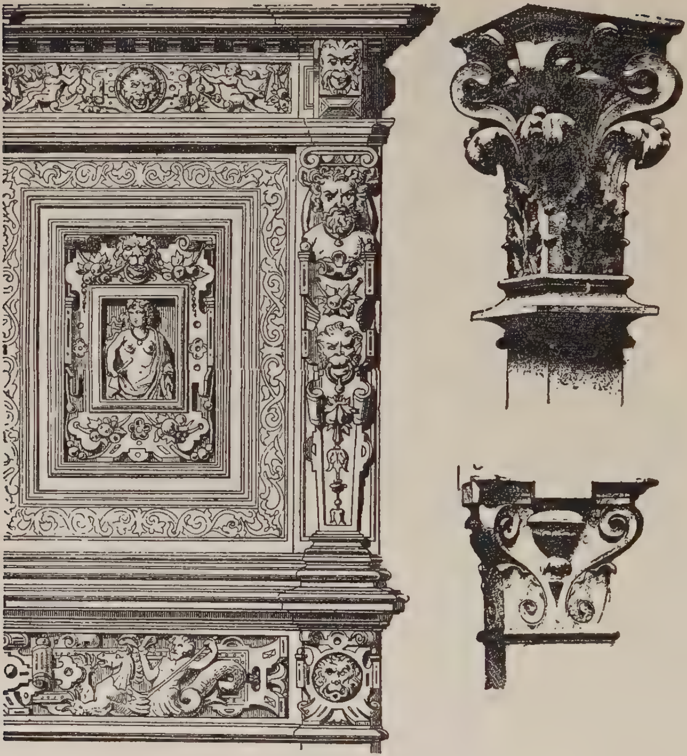


Figure 97

Details which show the manner in which the Renaissance developed in Flanders and in France.

royal architect, reached the form which is seen in that architect's work on the great Palace of Versailles.

With the reign of Louis XV (1715-1774), when the "Little Trianon" was built at Versailles, French architecture, still Classic in its general inspiration, de-

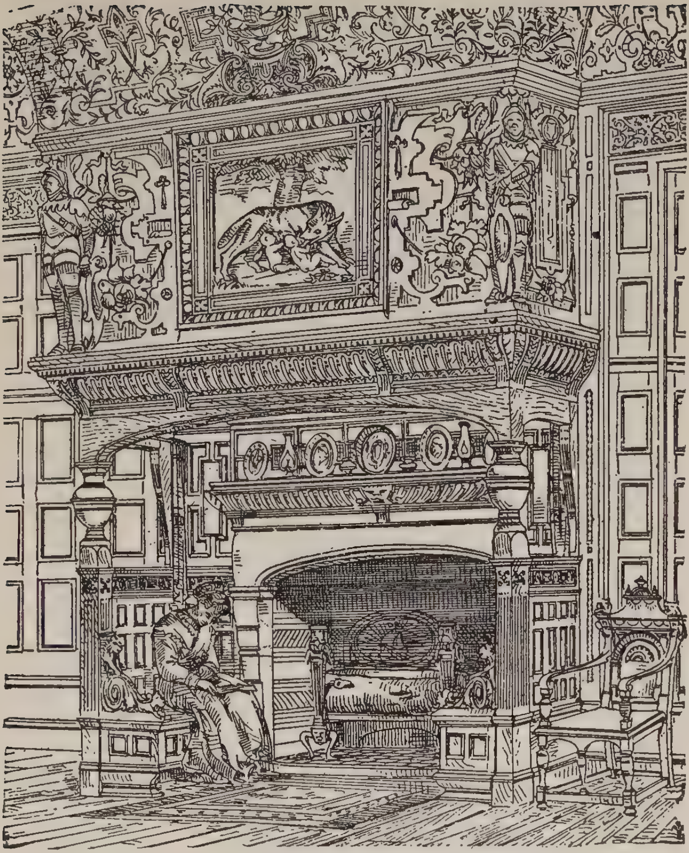


Figure 98

In England the Renaissance began to affect architectural design in the Elizabethan period, of which this interior is an illustration.

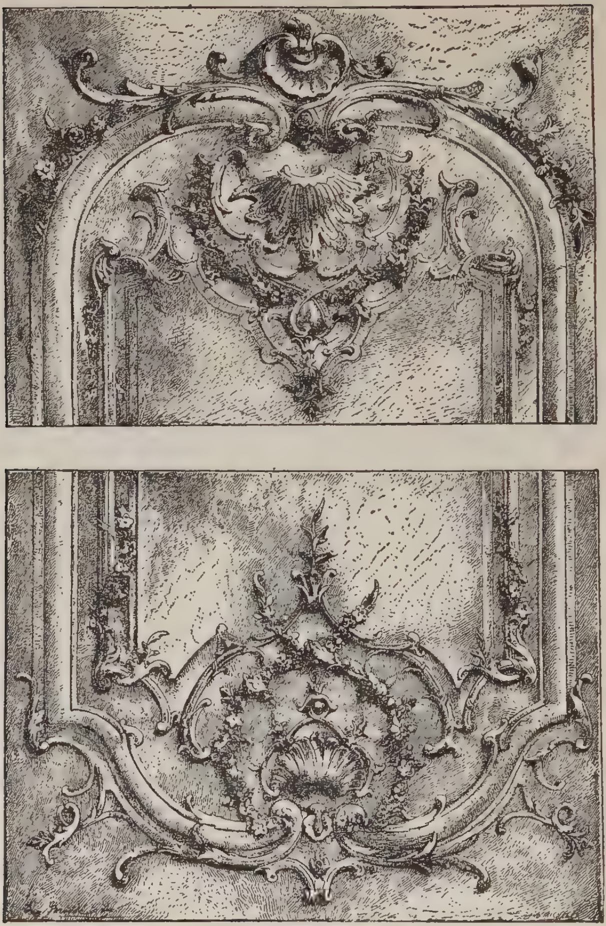


Figure 99

The French Rococo style of Louis XV followed a long previous period of Renaissance expression, and reflects the general temperament of its time.

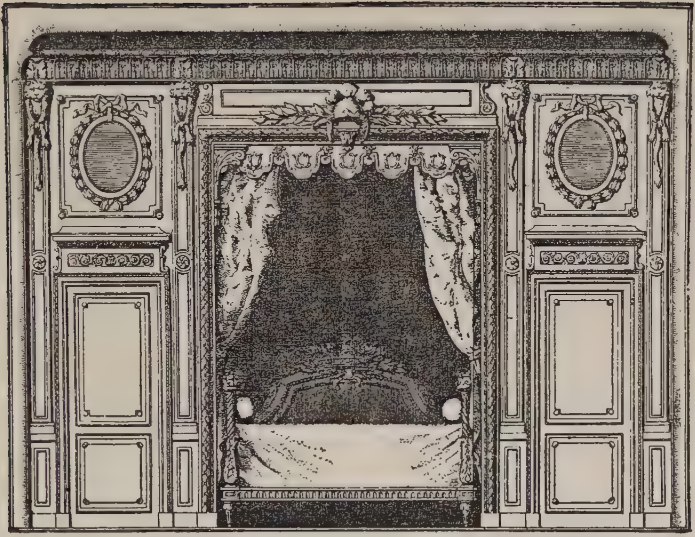


Figure 100
Under Louis XVI, architectural style in France again swung back to a manner even more classic than the Renaissance.

veloped the style called "Rococo," mostly seen in interiors. Figure 99 gives a good idea of the Rococo detail of the Louis XV period.

Under Louis XVI (1715-1774) there was a decided Classic Revival, and beautiful proportions and refined detail characterized both architecture and interiors. Figure 100 shows many typical details.

Meanwhile, a Classic Revival was taking place in England, following the period of Queen Anne (1702-1714). The style was more directly inspired by Classic forms than the English Renaissance style had been, and several architects, such as Inigo Jones, became famous, and Sir Christopher Wren, who built the great domed St. Paul's Cathedral in London.

With the Georgian Period (1714-1820), when the three Georges ruled England, the Classic Revival began to be influenced by the French style of Louis XVI, and by the wonderful discoveries which were being made in Italy, where the buried Roman cities of Pompeii and Herculaneum were being uncovered. Artists and architects travelled to Italy for inspiration, and Classic forms dominated architectural design both in England and on the Continent. This was the period of the famous furniture designers—Chippendale, Hepplewhite, Sheraton and the Brothers Adam. There were four of these brothers, and they not only designed and made furniture, but practiced architecture as well, and it is their type of Georgian design that most influenced our own Colonial architecture in this country. Figure 101 shows a measured drawing, with details, of a mantel from a house built in Washington, D. C., in 1801 (now called the "Octagon House," and headquarters of the American Institute of Architects). The design is thoroughly characteristic of the style of the Brothers Adam, and shows how strongly their work influenced what we call "Colonial," or, more correctly, Georgian Colonial in this country.

In England at this time, an appreciation of "The Classic Taste," as it was called, formed part of a gentleman's education, and the prestige of the architecture of

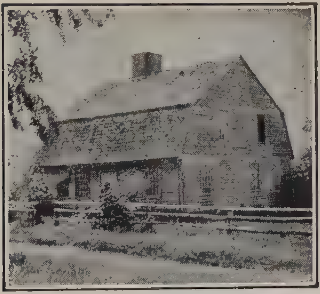


Fig. IX. Old New England Gambrel

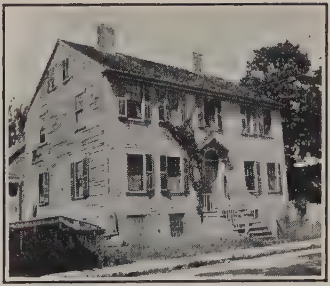


Fig. X. A New England Type

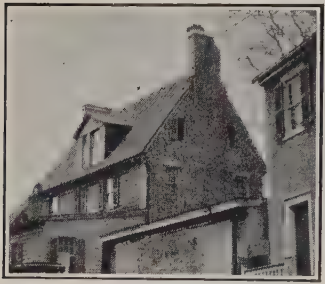


Fig. XI. The Delaware and Maryland Type

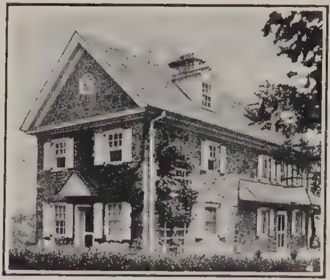


Fig. XII. The Pennsylvania Stone Type

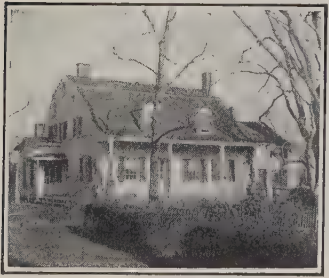


Fig. XIII. Characteristic old Dutch Colonial Type

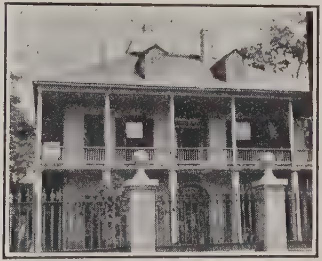


Fig. XIV. The Creole Architecture of Louisiana, in New Orleans

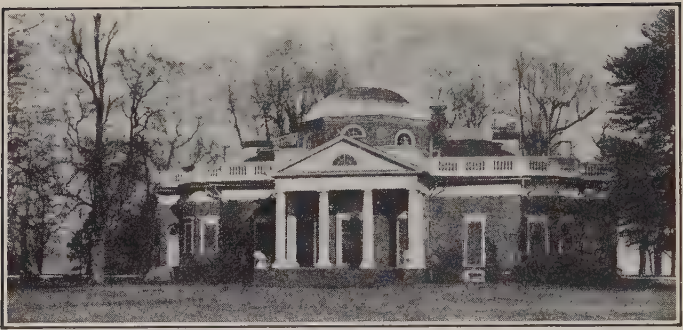


Fig. XV. "Monticello," Thomas Jefferson's home designed by himself

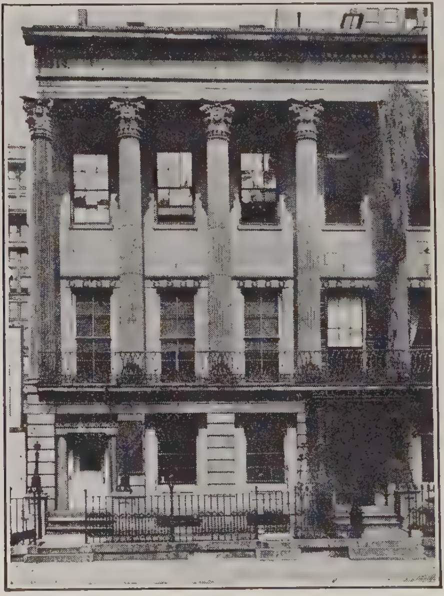


Fig. XVI. "Colonnade Row," the Classic Revival in America

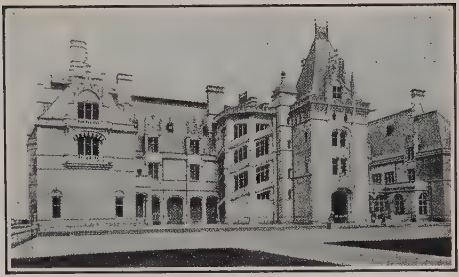


Fig. XVII. "Biltmore," North Carolina, the French chateau type

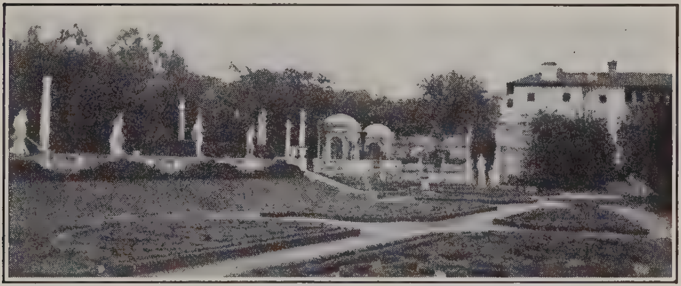


Fig. XVIII. An Italian garden and villa in Florida

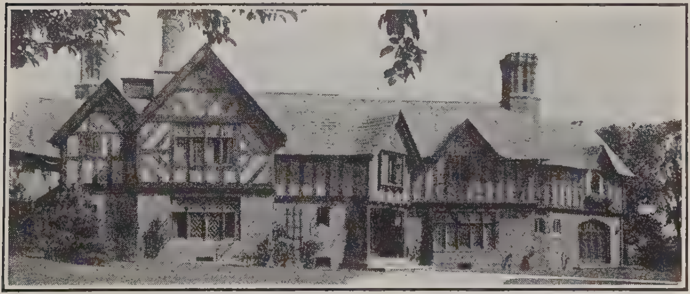


Fig. XIX. The English Half-timber type in America

MODERN ADAPTATIONS

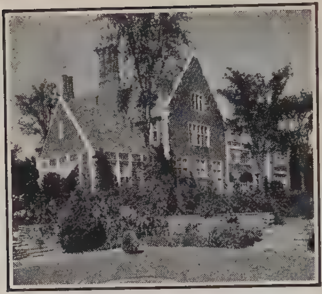


Fig. XX. A Formal English type in America

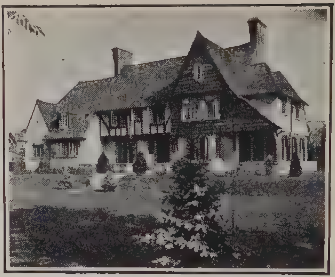


Fig. XXI. The Picturesque English type in America

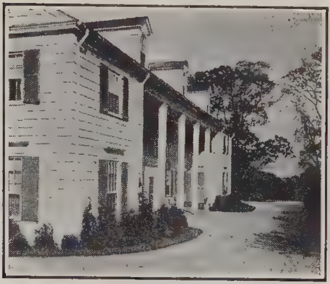


Fig. XXII. A Colonial American type, modern

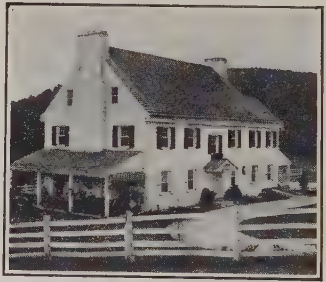


Fig. XXIII. A Pennsylvania Colonial type, modern

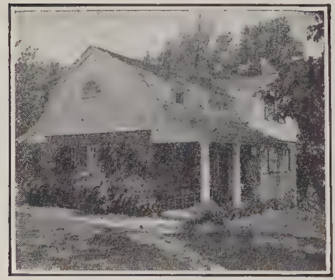


Fig. XXIV. A modern version of the Dutch Colonial type

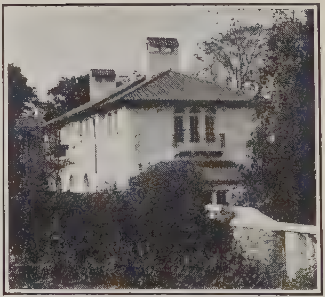


Fig. XXV. The Italian villa type in America

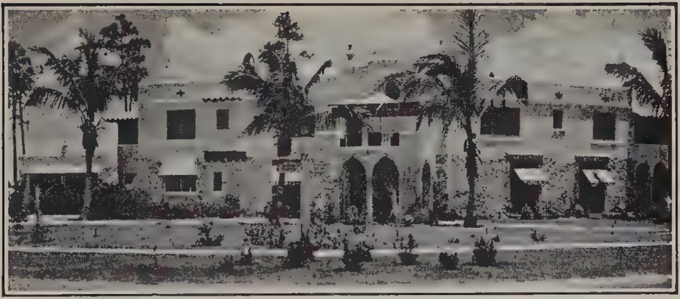


Fig. XXVI. A house in Florida, deriving from Algiers

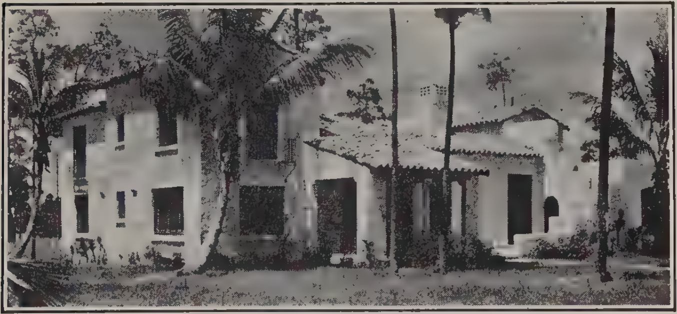


Fig. XXVII. The Spanish type in Florida

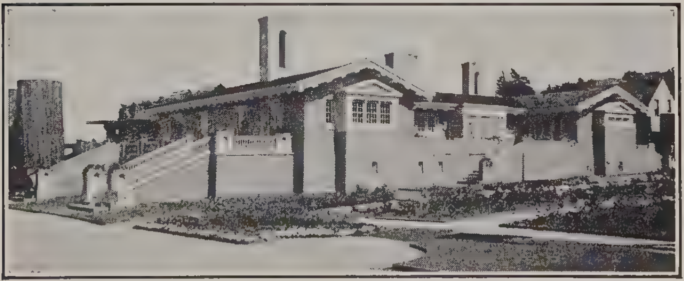


Fig. XXVIII. The California Bungalow—an American type

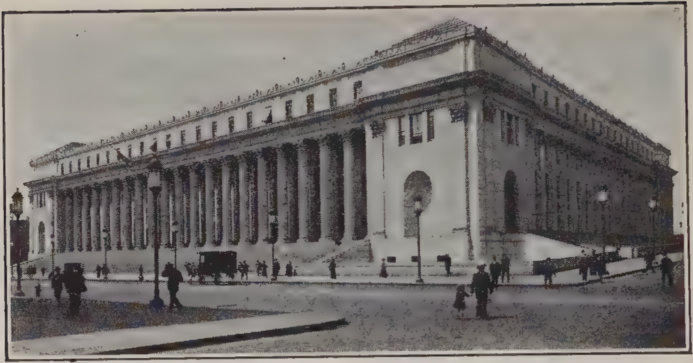


Fig. XXIX. New York Post Office, the classic "monumental" type

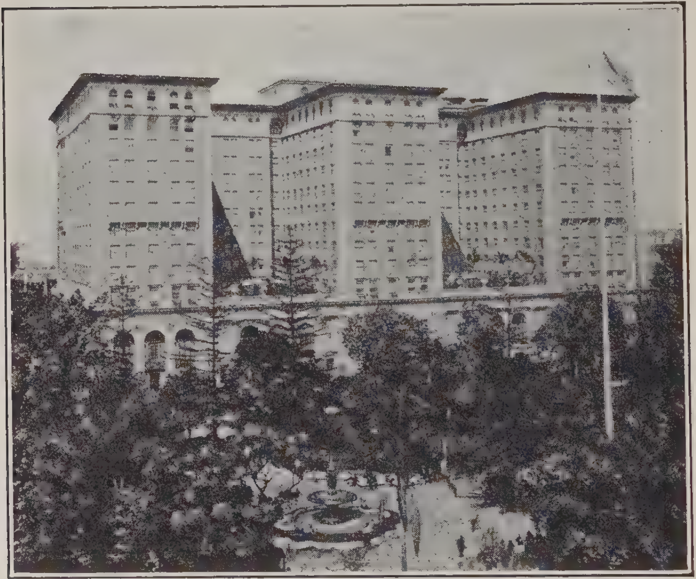


Fig. XXX. The great modern hotel type of America, the Los Angeles Biltmore

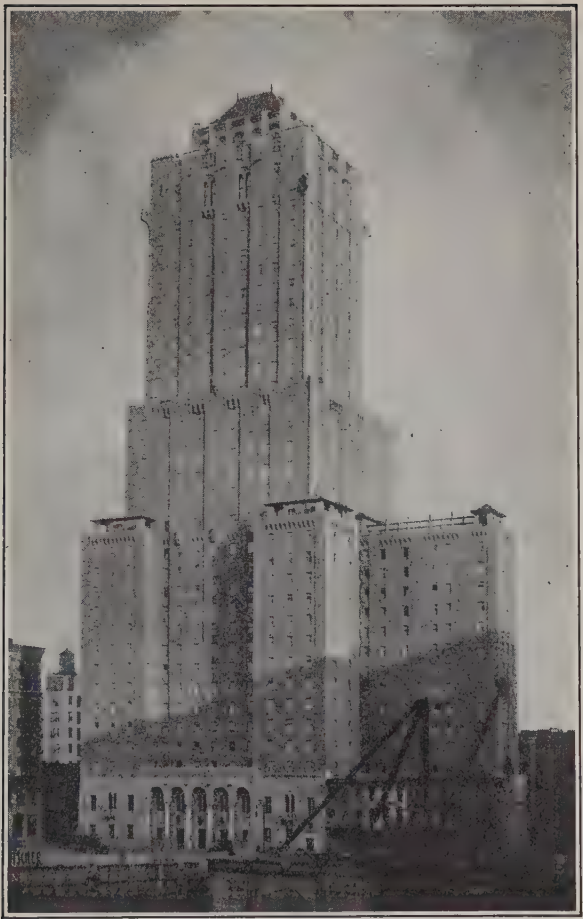


Fig. XXXI. The New Architecture—the towering masses of the Shelton, in New York City

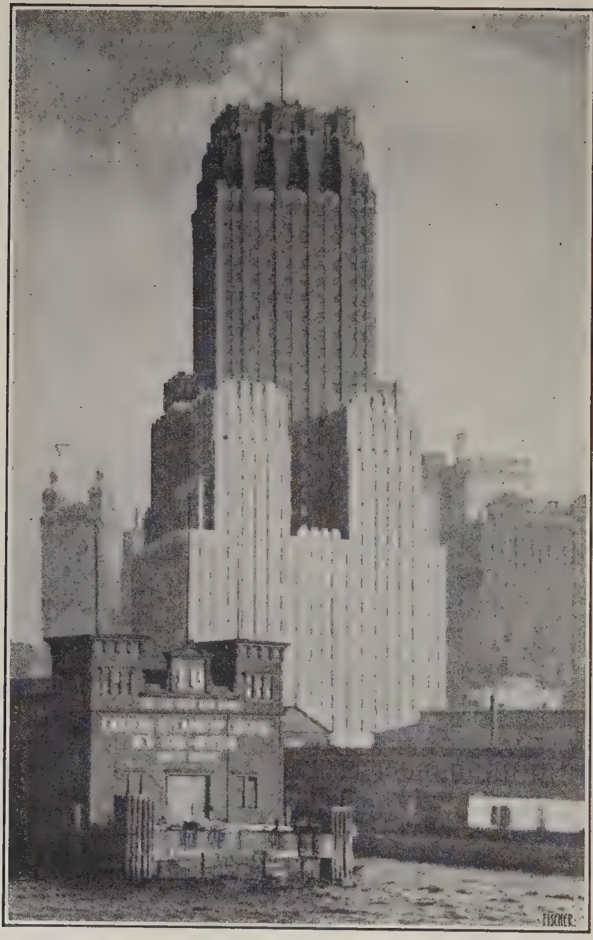


Fig. XXXII. An impressive example of the New Architecture—the massive profile of the New York Telephone Building

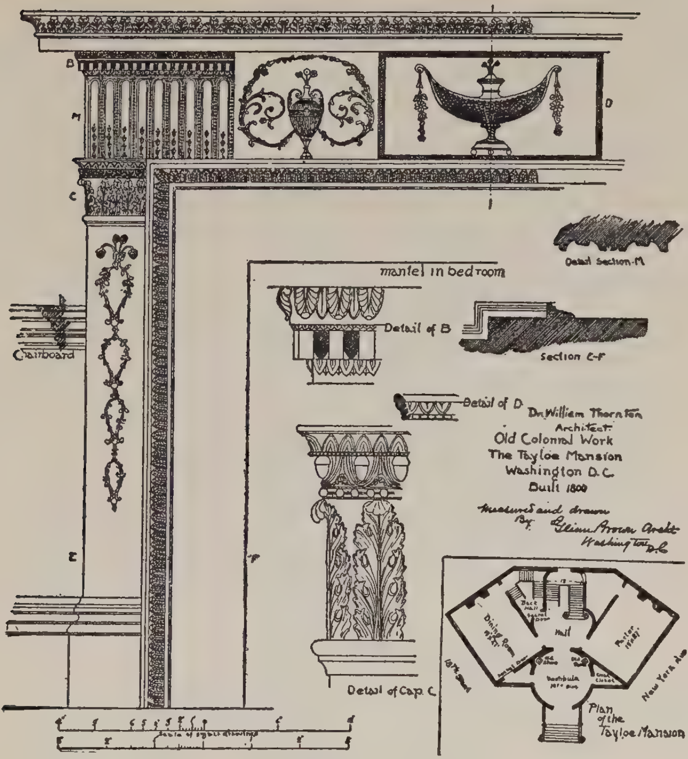


Figure 101

Following the Renaissance in England came a "Classic Revival," the style of the Brothers Adam, which directly inspired the Georgian Colonial style of America.

Greece, coming through Rome and Renaissance Italy, showed that ancient art as having a vitality strong enough to bridge the centuries and meet the needs and tastes of different and a newer civilization.

Returning, for a moment, to France, we find, after Louis XVI, a Classic taste gone to extremes. From 1793 to 1795 the Revolution was in progress, followed by the Directoire period, which lasted until 1804. The next ten years, the Empire, developed its own style, which showed none of the purity and fineness of the Greek Classic, but rather a heavy and pompous version of Roman architecture. As in the Directoire (which was purely Greek) the women even wore Classic costumes and dressed their hair in the manner of ancient Greece and Rome.

Our principal interest in this very Classic French style comes from the fact that it became one of the influences on the early architecture of this country, at the time when the War of 1812 estranged us from England. Our architecture of the Georgian Colonial period had already got its Classic inspiration from the Classic Revival of Georgian England, and this was given further direction toward the Classic through this later influence from France. This combination of influences is indicated on the chart (Fig. 69), which shows the great impulse of the Renaissance remodelling the architecture of England, Flanders, Italy, France and Spain, with the direct current flowing through the English Classic Revival to our Georgian Colonial, and a further connection between this and the Classic Revival in this country as it came to us from France.

One style only on the chart remains to comment on—the Baroque which came at the end of the Renaissance in Italy. It is a style seldom seen now, and little

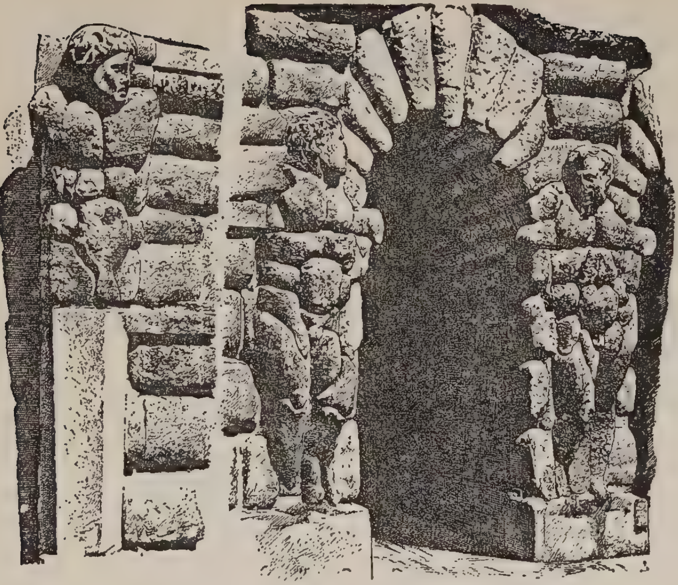


Figure 102
The last expression of the Renaissance in Italy was the rather theatrical Baroque style, seen at its best in the garden architecture, fountains and grottoes of the great villas.

understood, because it is too elaborate and extreme for general use today. In Baroque design every detail of Italian Renaissance architecture was multiplied, elaborated and exaggerated. The style is to be seen in Italy today mostly in late Renaissance additions to the country villas, where many architectural incidents in the villa gardens, especially fountains and artificial grottos, were done in the Baroque manner. The only traceable influences that Baroque had after its popularity in the last years of the Renaissance is seen in the Rococo French style of Louis XV in France, and in what is called the "Plateresque" style of Spain, found in the early buildings of the Spanish Colonies in America, more than in Spain itself.

So now we have held a brief review of the principal architectural styles, and traced the main current through a simplified chart which brings our study of style up to the days of the Early Republic in this country, at a date a half century before the Civil War. And at this point we will take it up again in Chapter III, since the next chapter must take up the varieties of style that developed in various parts of the newly settled land which became, after 1776, the United States of America.

CHAPTER 2

WHAT IS COLONIAL ARCHITECTURE?—THE EARLY AMERICAN COLONISTS AND THEIR ARCHITECTURE —"GEORGIAN COLONIAL" AND "THE CLASSIC REVIVAL"

IT is not surprising that the term "Colonial" has come to mean so many different things to different people, in spite of the efforts of a number of writers to bring about a more accurate knowledge of its real meaning. People thoughtlessly allude to almost any building up to the time of the Civil War as "Colonial," although nothing built after 1776 should properly be so called. Neither is all Colonial architecture "Georgian." Some of it is pre-Georgian—and from the time of the first settlements in the New Country, different types grew up in different localities. A brief account of each type, from its beginnings, through to the beginning of the nineteenth century will be attempted, because it is only against the early architecture of this country as a background that a clear vision may be had of our architecture of today.

The log-cabin stage of pioneer building does not, of course, contribute any architectural style: houses were merely temporary shelters in the wilderness, and it was not until comparative leisure and prosperity came to the colonists that permanent construction became possible. This, however, was not long, for the famous old Fairbanks house, at Dedham, Mass., was built in 1636, and the Pilgrims had only landed at Plymouth Rock in 1620. All through New England are scattered houses that were built before the middle of the seventeenth century, and many of these show such definite Elizabethan English traits as overhanging second stories, rows of small casements, leaded with diamond-shaped panes, and many are of actual half-timber construction. The old half-timbered houses of New England, though, do not expose this construction, but conceal it behind clapboarding. Examination of many of the oldest New England houses shows workmanship in the timbering that reveals the work of builders who had learned their craft in England from older artisans who, in turn, had learned from workmen who still handed down to their apprentices the building traditions of the Middle Ages. The continuity of architecture carries on as closely as that from the Middle Ages to the middle of the seventeenth century, and across an ocean.

The earliest New England houses had pointed roofs, and often over-hanging second stories, like the House of the Seven Gables, built in Salem in 1669. Because heating was an important problem, practically all New England houses have great stone chimneys rising through the center of the roof, which, in the earliest examples, is pointed. Fireplaces in each room open into the central chimney, and the entrance hall is reduced to little more than a vestibule. It is a scheme very different from the broad hall of the Southern houses, running from front to back of the house, with an open stair-well.

The first New England gambrel roofs were built about 1670, and as the first houses of the Dutch settlers in New York and New Jersey were built as early as 1613, it is to be supposed that the New Englanders got the idea from the Dutch, especially as there is no English precedent for the gambrel. (Figs. IX and XIII).

A gambrel roof is one in which the pitch, or inclination of the roof changes its slope between the ridge-pole and the eaves. Figure 103 shows the difference between the Dutch and the New England types, in profile, the New England being the steeper of the two.

The earlier New England houses are noticeably plain as to their exteriors, which were of clapboards or

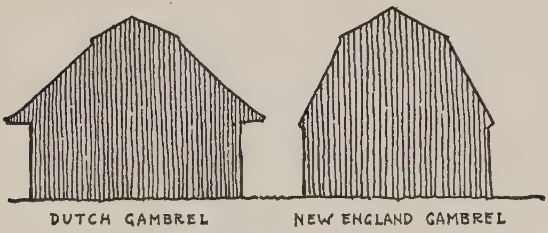


Figure 103

Two silhouettes showing the marked difference between New England and Dutch Colonial gambrel roofs.

shingles: usually there was no outside elaboration at all except, possibly, the door treatment, yet inside often there are beautifully panelled interiors, with pilasters and moulded cornices. The New England colonists were not, for the most part, prosperous, and it was not until the development of overseas trade by fast-sailing merchant-men that New England houses took on the handsome appearance now still to be seen in Salem, Newport, New Bedford, Nantucket and few other old seaport towns. (Figures 21, 22, IX and X).

In Salem the famous wood-carver McIntyre (who was also an architect) carried the finest Georgian traditions on into the period of the Classic Revival, and left a great many doorways and mantels which are the finest examples of their kind in the country. An interesting detail of many of the New England seaport houses is the "Captain's Walk," a railed platform built on the roof to command a view of the harbor. Here ship-owner or retired captain, telescope in hand, could catch a first glimpse of returning ships.

Rhode Island contained a type of early colonial house unlike those of any other part of New England. These were manor houses on slave-owning estates in the Narragansett part of the state, southward from Providence to Point Judith. Several of these old houses are still standing, very plain as to their exteriors, but with beautifully panelled rooms inside and one, the Robinson Manor, has an unusually elaborate entrance hall, with twisted balusters on the stair-rail. These houses were pre-Georgian, and very fine for their time.

There was very little brick in New England, and it was sparingly used by the early builders. Fieldstone was plentiful, but was seldom used for anything but foundations and chimneys, and the prevailing construction was of frame, with shingle or clapboard covering.

Most New England houses and churches that are commonly called "Colonial" are of the Classic Revival period, which was New England's most prosperous era. From Maine to Connecticut the more substantial citizens, built great square houses with porticos of Greek columns, while smaller houses were content with a simple Doric porch and a Greek cornice. The Classic Revival type throughout New England is easy to recognize, and makes up by far the greatest proportion of early New England building.

In New York there are plenty of examples of buildings by English colonists, representing the Georgian period and earlier times. These are not at all unlike the Colonial and Classic Revival architecture of New England—but the distinctive type is found in the houses of the early Dutch settlers, who built in New York, far up the Hudson, on Long Island, Staten Island and in the northern part of New Jersey, across the river.

These houses, dating back as far as 1613, were all farm-houses, and are recognized by their low-pitched gambrel roofs. The older ones had steeply pitched pointed roofs, but both types had wide eaves, and were the same in construction and character. In most examples all the rooms were on the ground floor and the space under the roof was used only for storage.

The materials were varied, as the old Dutch builders used brick, stone or wood, and sometimes all three in the same house. It is from the Dutch Colonial type that many houses of today have borrowed the solid shutters, either battered or panelled, with crescent moons or other shapes cut in them. The Dutch door, cut horizontally in two halves, is another quaint detail of these houses, which, because they are so home-like and attractive, have been very popular as a type for modern adaptation. (Figures XIII and XXIV).

In Pennsylvania the early settlers were of several nationalities—German, Swedish, English and Welsh—but the architecture was influenced mostly by the English and Welsh. Such names as Bryn Mawr, Cynwyd and Radnor are reminders today of the men who came from Wales and brought with them their vigorous native technique as stone-masons. Local building stone was plentiful, so the Pennsylvania type, especially around Philadelphia, was the stone house, often roughly stuccoed. From 1720 the Georgian style in detail became more and more important, and as many prominent families from England were either comparatively wealthy, or became so, there were many very fine houses in this part of the country. The general mode of living was largely English, and the country houses and gardens in the vicinity of Philadelphia—many of them carefully preserved through continuous ownership by the original families—show a leisurely and prosperous kind of life as compared with the more rigorous life of New England. (Figure XII).

Immediately south of Philadelphia—in Delaware and Maryland, and further South, in Virginia—a brick architecture is encountered. The houses are characterized by the placement of their chimneys on both gable ends, and by the usually steep pitch of their roofs. In Maryland—Baltimore and Annapolis, both important places from the earliest times, there are excellent examples of this Colonial brick architecture. (Figure XI).

Further South the same character is apparent—in such famous old mansions, for example, as "Westover," the home of the Byrds in Virginia. The houses with tall Greek porticos, usually thought of as typical "Southern Colonial" homes came later, with the Classic Revival. The actual Colonial dwellings were pre-Georgian and, with a few notable exceptions, were not very pretentious.

One often hears that all the bricks used in building certain of these early houses were brought over from England, but this legend has been disproved by later research which finds that brick-makers and bricklayers were among the first artisans brought over by the colonists, and that the making of brick, particularly in the South, was one of the first industries established and promoted here.

There was always a character in the Southern houses different from that of the houses of New England because most of the Southern colonists were gentlefolk and were of sufficient means to set up at once with substantial establishments, bringing over quantities of fine furniture and other belongings, and availing themselves of the services of skilled artisans in the building of their homes.

Through the Carolinas, Georgia and the other Southern states there were plantation houses, some of them lordly manors, but we encounter no marked style until we come to the old Creole architecture of Louisiana. This represents a type seen nowhere else in this country—a two-story house with low, spreading roof, its distinctive feature the "gallery" or porch, with rails and lightly proportioned posts of wood. The principal rooms were on the second floor, the kitchens and servants on the ground floor. The type is an interesting and picturesque one, but has never been used as a basis for modern development in houses of today, either in its own locality or elsewhere. (Figure XIV).

One other style remains to include with these notes—the style of the Spanish missionaries, who were among the very earliest to reach these shores. Their works are found only on the Pacific Coast and in the Southwest (if we except the ancient gate-posts in St. Augustine, in Florida), and it is on the Pacific Coast that the influence of the old Padres is most apparent.

The Mission style is necessarily a primitive one, but full of character and a charm of its own that has not only made it survive but also experience a renaissance in its wide use for many types of building in California. About 1900 the name "Mission" became very popular in connection with various types of "craftsman" furniture and interiors, but its only really accurate use is to denote the architecture of the old Spanish missions of California and the Southwest.

This survey covers, very briefly, the earliest architecture in this country, as related to dwellings. Of public buildings there are not so many, and those which remain represent fewer varieties in style. Many old churches survive from the Georgian period, and the white painted wooden steeple is a familiar part of any New England landscape. The most important of all our early public buildings is, no doubt, Independence Hall in Philadelphia, started in 1733, a dignified brick building that has served as an inspiration for countless modern buildings for town halls, libraries and schools throughout the country.

A list of other important buildings of about the same period would include The Old State House (1728) and Fanueil Hall (1741) in Boston, Carpenter's Hall in Philadelphia, the earliest buildings of Harvard University in Cambridge and the old State House of Rhode Island (1743), still standing in fine dignity at the head of the "Parade," or "Mall," as its site in Newport is still called.

Before closing this chapter a little more should be said about the Classic Revival in America, partly because, in itself, it is an important architectural style and partly because it should never be confused with the Georgian Colonial and carelessly called "Colonial."

Even as early as 1795, when the Boston State House was built on Beacon Hill, the English Georgian of

Colonial days was beginning to give way to the more strict Classic that had become the absolute style in France. This style in its perfection, transplanted, is seen in the old houses called "Colonnade Row" in New York, built in 1836—and of what happened in the years between that date and the present day we will discover in the next chapter. (Figure XVI).

At its best, the Classic Revival was a fine and dignified style, better suited to the design of large and imposing buildings than to small ones. The Capitol at Washington is a good example of Classic Revival, and also the City Hall of New York. And nowhere is the style seen to better advantage than in the buildings of the University of Virginia, which was designed by Thomas Jefferson.

In the hands of capable architects, or as built from the designs of owners who, like Jefferson, possessed taste and ability, the Classic Revival house was given a handsome architectural quality that has survived many changes in taste and fashion. The old Lee mansion at Arlington, across the Potomac from Washington is an excellent example, or "Andalusia," on the Delaware River. Classic Revival houses were built even as far West as Michigan, and New England is full of them, though the type is more generally associated with the South, where many of the finest examples are to be found. It was inevitable that many rather absurd things were done without architectural sanction. When a very small house was fitted with a Classic Greek portico with columns towering from ground to cornice, the style seems forced and ceases to be good architecture because it is "out of scale." And when Greek forms were badly bungled (as was often the case) the style won for itself such names as "Carpenter's Classic," and gradually fell into disrepute.

In thinking of the style, however, we should think of its earlier and better examples, for they are a highly creditable part of American architectural achievement. And it should be easy for anyone to distinguish houses and churches of the Classic Revival period from the older Colonial houses. In looking at a house which you might, without thinking, call "Colonial," you will notice if its detail is in every way borrowed from a Greek Temple—usually Doric, though sometimes Ionic and occasionally Corinthian—in which case it is Classic Revival, or if its detail seems more like that of the Italian Renaissance, translated by English architects—in which case it is Georgian Colonial.

Although both have their sources in Classic architecture, the Classic Revival is an Americanized French style and the Georgian Colonial is a style purely English.

CHAPTER 3

The American Country House to Date—Fifty Years of Architectural Experiments—The Present Century: Age of Adaptations

Many things were happening in this country at the time the Classic Revival in architecture was at its height. It was the era of the clipper ship, those fast, graceful merchant fliers that traded up and down the world from American ports and raced each other under full sail with passengers and mail around the Horn to California, where the '49 gold rush had carried our star of empire to the Far West. Pioneers in homesteading were trekking overland in covered wagons and pioneers in industry were laying the foundations of later fortunes.

The five arts, architecture among them, came in for an ever lessening share of interest and attention, and gradually the Classic Revival grew less Classic and more a carpenter's habit than an architectural style. The Civil War, which wrecked many fortunes, North and South, represented a period of general confusion, which lasted through the Reconstruction period, and found us, at the end of it, with no traces of taste for the Classics, either Georgian or of the Revival.

Somehow the fashion arose for a very bad type of French architecture, a forlorn imitation of the "Grand Manner" of Louis XIV. Even the name of his court architect, Mansart is immortalized in the mansard roof. In the 1870's and 1880's some of the fortunes started by pioneers of pre-Civil War days grew to vast proportions: the country was growing yearly more settled and more prosperous, and pretentious homes were the natural expression of this condition.

"Mansions," these houses were called, and it is doubtful if any architecture in worse taste has ever been created at any other time or in any other country in the world. They were tall and square, their first floor rooms pompously lofty and their ungainly bulk crowned with a "cupola" or a tower, rising uselessly above the slate-covered mansard roof. There are thousands of these houses scattered throughout the country, as far West as Chicago, and though many may hold sentimental associations for today's older generation as childhood homes, they are none the less atrociously bad architecture.

Not only were these houses bad in design, the whole manner of their building was bad, from the point of view of architectural honesty and intelligence. They were soundly enough built, structurally, but their builders had absolutely no respect for building materials or appreciation of honest effect. Wood and cast iron were "sanded" to resemble stone; brick work was painted, either the actual bricks, or imitation of brick walls done on smooth stucco surfaces; common woods

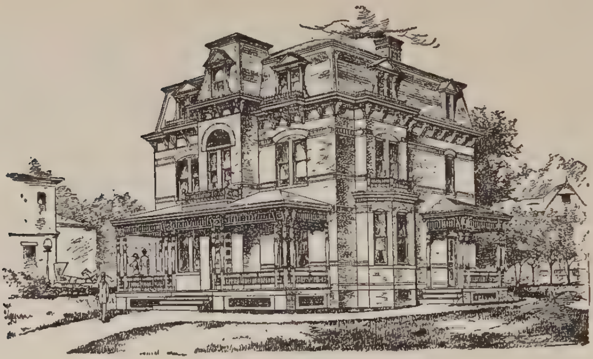


Figure 104
Architectural bad taste in the 1880'*s—a typical four-square house with mansard roof, meaningless "tower" and general effect of imitation grandeur.*

were "grained," an art that consisted of painting elaborate graining and figuring, and wood and plaster were painted to represent rare marbles. The ideal even for actual materials was not a good one, for it glorified the smoothing of everything, regardless of its natural character. All lumber was smoothly milled; slates were split as thin as possible and laid with such uniformity as to resemble oilcloth—and the ideal brick was smooth, hard textured and exactly matched every other brick in a wall. The ideal brick wall, in fact, was a wall so uniform in color and so entirely without texture that it might, indeed, be done with paint instead of with bricks.

It was an age of sham, in architecture if not in other arts. The fine old wrought iron work of Colonial and early American days was forgotten in the heavy designs for cast iron that were now the fashion. The interiors of houses, as well as their exteriors, were a riot of carpenter work. There were no plain mouldings or woodwork such as we know today: labor was cheap, so interiors were filled with intricate panelling, turned spindles, meaningless carving and general elaboration—and everything glistened with varnish.

To describe the furniture, the draperies, the lighting fixtures and general decorations would be to indulge in too much detail and would depart too far from architecture, but everyone knows the utter lack of taste these things expressed.

A variation of the mansard roof house was the Swiss chalet type, affected by people who wished to seem a little less formal than their more pompous neighbors. As built in this country, and in the taste of the times, these chalets were never anything but ridiculous, and it is to their popularity in the 1880's that New York owes its innumerable little Swiss chalets masquerading as stations along the line of the elevated railroad.

Another architectural curiosity of the 1880's was the style facetiously called "Carpenter's Gothic"—surviving still in many now shabby old houses with sharply pointed roofs, pointed windows and much scroll-sawed wooden filagree work—the whole forlorn mistake being attributed to vague inspiration from misunderstanding the writings of Ruskin, which appeared at this time.

Typical of this period were the garden decorations

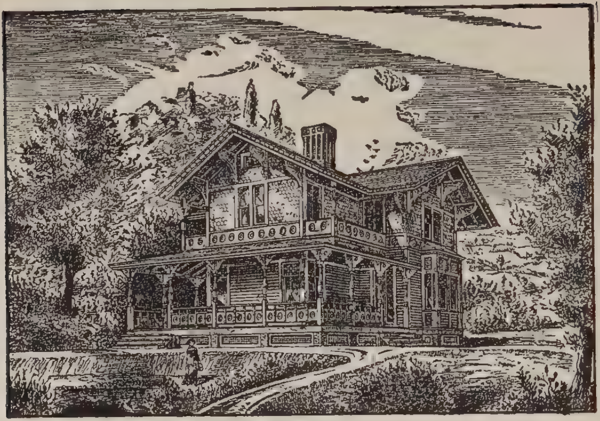


Figure 105
An architectural curiosity of the 1880's—*an American country house built with the intention of suggesting, with no reason or intelligence, a Swiss chalet.*

in cast iron—stags and other animals, or the fountain surmounted by life-size figures of two children under an umbrella, from which the water dripped back into the basin. And there was, also, the life-size cast iron figure of a little colored boy, in tattered clothes, with hand held up to hold the reins of visiting carriages. Nearly everyone has seen these curiosities of a bygone age, and perhaps some of us still feel a little sentiment about them, even while we are wondering how many years more they will survive in an age that has so completely out-lived them.

Public buildings of this era were quite as bad as private houses, and their lack of merit cannot be laid simply to shifting fashions. They were definitely poor architecture.

Exception should be made only of the buildings of what was called the "Romanesque Revival." This style was developed by one of the few real architects of the period, H. H. Richardson, who designed a great many houses, libraries, railroad stations and other buildings that were, and still are, fine examples of architecture. His influence was wide, and many of his followers also left excellent work, while others achieved only very poor imitations. The style was a very massive one, generally utilizing "rock faced" masonry, great round towers and cavernous arches—all of which, in the hands of Richardson, were used with lasting effectiveness.

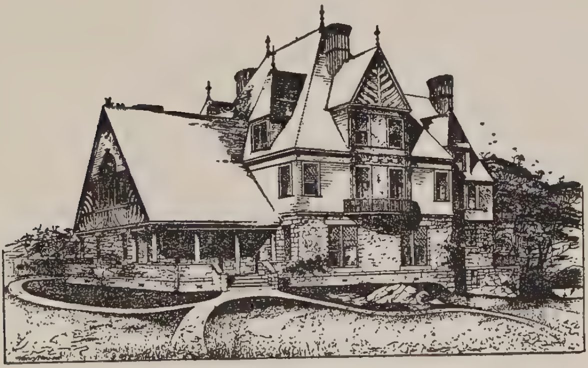


Figure 106
An American country house of the "picturesque" type, very fashionable and very popular from about 1887 *to* 1897.

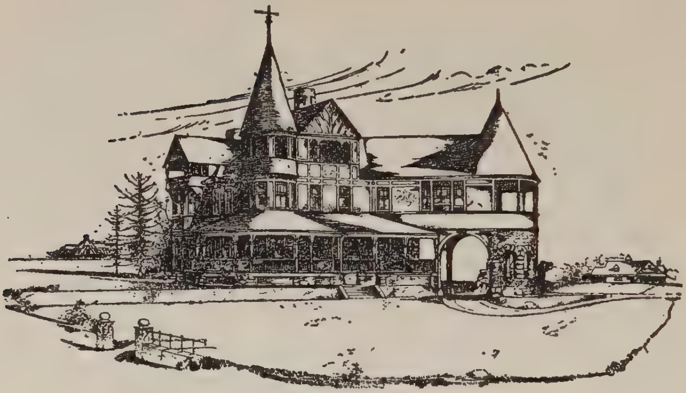


Figure 107
This type of American country house lasted in favor up to the close of the 1890*'s, and while, as a type, it is now quite out of fashion, many of these houses are not without a certain charm of their own.*

So much for the twenty years from 1870 to 1890. The century's end saw, in its last ten years, widespread stirrings of a new revival of taste.

Richardson's Romanesque was still fairly popular, and many handsome houses were being done in the French style of Francis I, "transitional" from Gothic to Renaissance. It was a time of architectural experimenting.

It was about this time—the first half of the 1890's—that a certain type of country house became extremely popular. It is a type, however, that has never been definitely named. Essentially, it aimed at the picturesque, and had at least a part of its inspiration in the work of H. H. Richardson. Two typical examples are seen in Figures 106 and 107, and any number of these houses are still to be seen in such places as Newport, Bar Harbor, Narragansett Pier and on the Long Island Sound.

Although they cannot properly be considered as good architecture, many of these houses were not without a real degree of charm: certainly they give evidence of great imagination on the part of the architects of the period, and of a very real flair for the picturesque. They gave way, about 1900, to our present tendency to adapt Colonial, English, Italian and Spanish types to the American country and suburban house.

The great World's Fair at Chicago revealed to a nation that had almost forgotten them the everlasting beauty and fitness of Classic and Renaissance architecture.

Daniel Burnham, R. H. Hunt, and McKim, Mead & White were the great architects of the period, and the last named firm began to exert an influence on American architecture that marks the turning point in taste and the dividing line between the old and the new.

McKim, Mead & White were architects of wide knowledge, for they were capable of working in several styles, but always with a fine sense of scholarly appreciation and beautiful scale. They did a number of fine revivals of Georgian Colonial architecture, some excellent Romanesque work, some picturesque buildings like the Casinos at Newport and Narragansett Pier—but, most important of all, their immortal work in the

Italian Renaissance. It would involve too much detail to mention here more than the most important of these, but any student of architecture visiting New York might well wish to see for himself some of the buildings which brought about the revival of architectural taste that has lasted since that last ten years of the nineteenth century.

It is tragically unfortunate that two of the finest McKim, Mead & White buildings have been demolished —the famous Spanish-Italian Madison Square Garden, and the little Byzantine Church on Madison Square. But you may still find the old Colony Club, the Century Club, the Harvard Club, the University Club, the Judson Memorial Church, the Morgan private library, Columbia University Library and the great Pennsylvania Terminal. And as a study in detail there is the beautiful Romanesque triple portal built into the new St. Bartholomew's Church from its former building on another site.

Returning to country houses—certain of the great fortunes of pioneer origin, as well as many of less historic growth, had become even greater, and it became the fashion to build what have since come to be called by the rather uncomplimentary term "show places."

These were great houses of fabulous cost, some of them in New York, some in Newport and other summer places, or on vast isolated estates like Biltmore in North Carolina, the old Vanderbilt place, and one of finest French chateaux ever built in this country.

These places, today, have outlived the social scheme of which they formed the keystone. Not only have the boundaries of "society," as it existed in the 1890's, become virtually lost, but the whole machinery of existence has changed during the past quarter century. The care and responsibility of the palatial house, whether in town or country, have grown irksome even to those who might well afford the ever-mounting cost of upkeep, and one by one the great town houses have been closed, then demolished, with the same fate gradually overtaking the country places.

Living, since the World War, has become increasingly simplified. In the city the town house has largely given way to the apartment house (either rented or co-operatively owned) and in the country houses are neither so large nor so elaborate as the houses of a generation ago. And throughout the United States there are countless houses of moderate, and even of small size, which possess a vital architectural interest because they represent the dwellings of the many rather than the few.

In this age of adaptation of many architectural styles the only means of visualizing the American country house is to roughly classify it by general types, with a brief comment on each.

Native Types

With the exception of the old Creole houses of Louisiana, every variety of Colonial and early American house has been modernized and taken as a type for the country house of today. New England, Pennsylvania, Maryland and Virginia are filled with modern versions of their early houses, and not infrequently a Colonial type peculiar to one State is found in another. Houses of Dutch Colonial origin are found everywhere, and houses of Spanish or Italian derivation, which should properly be found in California and Florida, may be discovered in almost any State.

The Dutch Colonial adaptation, especially suited to small house design, is among the most popular, and has been done with admirable success in all parts of the country.

For the most part the architects have taken houses definitely of Colonial origin as the type for development into the modern American home, and it is only within very recent years that they have begun to adapt the Classic Revival as a style with possibilities for modernization.

In speaking of the Mission style as native to America, this variety of Spanish architecture should not be confused with the adaptations taken direct from Spain, as in the recent fashion in Florida. The Mission style was a much more simple thing, and has been carried out to perfection by a few California architects.

English Types

Some very fine houses have been built in careful adaptation of the Tudor, Elizabethan, and Jacobean styles of England. From their nature, houses of this type are expensive to build, and should be attempted only by architects who are willing to devote a great deal of time and attention to every detail of design and construction. (Figures XIX and XX and XXI show American versions of English types.) There are, unfortunately, a great many poorly done houses in these English styles, houses, especially, with imitation half-timber work.

Modifications of the cottage type of English house have added greatly to the expression of the picturesque in suburbs and countrysides from coast to coast, and a few architects, notably Harrie T. Lindeberg, have achieved outstanding success in the design of large country houses of the more modern English type.

French Types

Mention was made a little earlier of the adaptation of the Francis I style, and of the typical French chateau style in some of the great country places that were built in the 1890's, and of its frequent use, as well, in many of the finest town houses. "Biltmore," the great Vanderbilt chateau in North Carolina (Figure XVII) is probably the finest adaptation of the type ever done in this country. When fashion more or less forsook French styles for English and Italian, there were a good many years in which French influence in house design was in the discard. More recently there has been a successful effort to utilize the smaller French chateaux and farm houses as a style to adapt in this country, and a few architects, notably F. J. Forster are designing in the manner of the very old houses of Normandy.

ITALIAN AND SPANISH TYPES

Patterned after the Italian villas of Renaissance Italy there have been quantities of American houses both large and small, and many, in themselves, have been very well done. Because of our mental association of Italian villas with the warm climate of Italy, many of us are not impressed by the suitability of Italian villa adaptations in New England, or in any of our states

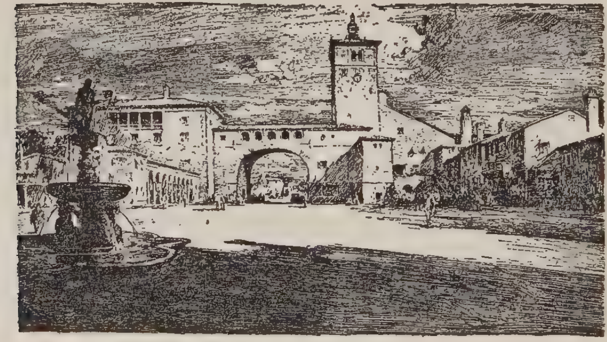


Figure 108
An excellently well-studied adaptation of Spanish architecture in a great gateway recently built in Florida.

Figure 109
An unconventional type of Spanish architecture successfully developed in Florida.

other than California and Florida, where the semi-tropical setting and the year-round gardening possibilities seem more in keeping.

There is probably no finer example of an Americanized Italian villa, including its garden, anywhere in the country than the great Deering villa in Miami, Florida.

In Florida, too, especially in recent years, the architecture of Spain has been freely adapted. Some of the adaptations, as also in California, have been excellent and some very poor, but the general result has been highly interesting. Not only have the majority of recent houses in Florida been designed in the Spanish manner, but a number of large hotels as well, and the Floridans have been even more adventuresome in architecture, achieving surprisingly successful adaptations of North African architecture, in stucco houses that are extraordinarily suggestive, in their essentials, of the houses of Tunis or Algiers.

The Bungalow

A type essentially American is the bungalow, its name borrowed from the English residence of India, and its style mostly without any recognizable stylistic origin. The bungalow has been, and is, a widely popular solution of the problem of designing a very small house. It is entirely on one floor, and is naturally an informal type of dwelling. Largely associated with California, the bungalow is found almost everywhere, and although it seldom achieves architectural qualities in its design, it is not to be overlooked, either as an expression of taste or of our varied living conditions and building problems.

One style which had its origin in Chicago is a little difficult to classify, but important to mention and illustrate as a definite American contribution to the architecture of the world (Fig. 110). The name which might

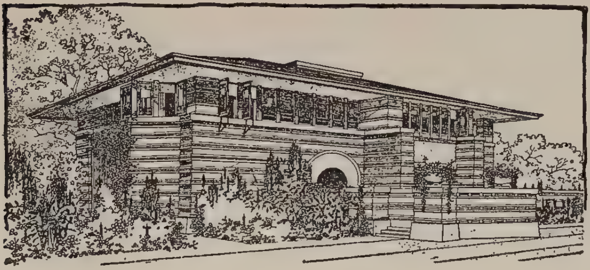


Figure 110
An original American style in country house architecture, sometimes called the "Prairie Style," or, more properly, the "American Secession."

best be fitted to this style, which was originated by the architect Frank Lloyd Wright, would be "American Secession," after the style of the "Viennese Secession," a group of designers who, about 1900, evolved a style of which the main purpose was complete secession from all historic precedent. Secession, certainly, is accomplished in these remarkable houses by Frank Lloyd Wright. Many of them were built in and near Chicago, and the same architect also designed and built the great Imperial Hotel, in Tokio, Japan, in the same manner—a building which represents, perhaps, one of the most remarkable personal achievements by an American architect.

With this necessarily brief summary of the architectural character of American houses today, the concluding chapter is devoted to the part played by historic architectural styles in other types of buildings.

When we consider the wide variety of entirely different styles which are currently adapted in American architecture today, it cannot seem remarkable that the whole effect lacks unity. The remarkable fact, rather, is that there is any appearance of unity at all. Possibly because people are not keenly conscious of architectural origins, possibly because of the unifying effect of modernization and adaptation to American living conditions, it is doubtful if the average individual is ever particularly disturbed by any feeling of too much diversity. What is, in reality, a crazy-quilt of architectural styles seems to look like a quiet and orderly pattern.

CHAPTER 4

Architecture in the Cities—Types and Styles—The New Idea

To look about any of our larger cities in quest of architecture is to discover further variety in styles, many contradictions and a vast amount of extraordinarily interesting material for study and speculation. Here, instead of a rough division by architectural styles, the most convenient and enlightening focus of our observation may lie in a division into types of building and the general tendencies in the architectural treatment of each.

Banks—Post Offices—Libraries—Museums

Gradually old buildings of these types, mostly poorly designed, badly lighted and badly ventilated are demolished and replaced by buildings in every respect better. In the larger cities we find the consistent tendency in the design of banks, post offices, libraries and museums is toward Classic precedent, whether in direct adaptation of the Greek, in Classic types derived through the Classic French manner (Louis XVI) or in the Classic character of the Italian Renaissance. In all these types of derivation the architect of today has distinguished himself, and has given us buildings which are not only refined and scholarly in their design, but admirably practical in their planning and equipment.

In smaller towns the buildings for banks, post offices and libraries are very often found to be designed in various adaptations of Georgian Colonial brick with limestone or terra-cotta trim.

Churches

The conventional idea of a church has remained largely dominated by the Gothic idea, though very few architects of today have shown themselves really capable of re-creating the Gothic style in modern church buildings. It is true that many churches have been designed in adaptations of Romanesque and Byzantine types, but the great majority have attempted the Gothic, though seldom with real success. Few churches, even in small country parishes, have been wise enough to adapt the white-steepled type of Georgian Colonial days which would come not only better within the limits of a small building fund, but better within the abilities of the average architect.

Railroad Terminals and Stations

Modern architecture has accomplished much in this type of building since the days of the vast smoky train-sheds under a broad-arched roof of glass. Typical of the amazing advance in meeting this essentially modern problem architecturally are the Grand Central and Pennsylvania Stations in New York, and such stations as the Union Station in Washington and the station in Detroit. Gradually the old, inconvenient and unattractive stations throughout the country are being replaced by the modern type, impressive in their appearance and planned with every practical convenience for the travelling public. Mention was made in connection with an Assyrian Palace, earlier in our story of architecture, of the use of ramps, or inclined footways in place of stairs. This is one effective innovation in the modern railroad station, as it has been found that crowds can move more quickly and easily up and down ramps than is possible on stairways.

Hotels and Apartments

The story of the modern hotel would furnish interesting material for an entire chapter in itself, beginning with the earlier examples in the larger cities of the Eastern States and concluding with the modern type now to be found throughout the country. (Figure XXX).

The sequence of progress might be summarized briefly as follows:

First the old-fashioned hotel, much in character, architecturally, with the private houses of the 1880's. Their efforts to express rich magnificence seem, today, almost pathetic, and little that resembles the modern hotel was achieved until the building of the Waldorf in New York. Here the style, in the interiors on the main floor, was of a very ornate French character, and the fashion was definitely set for a profusion of marble, gilded plaster, mirrors and potted palms. This ideal for the principal hotel interiors held in favor for many years, with constant improvement in taste, to be sure, but still very much in the manner of the eighteenth and nineteenth centuries in France.

A new idea in hotels dawned in this country with the building of the Ritz-Carlton in New York—a hotel entirely different from our imported version of French magnificence, because it was quietly Georgian in its architecture, decoration and furnishings. And about the same time other architects tried the experiment of designing a hotel in a highly modernized version of Italian Renaissance character. The newest hotels, naturally, capture popular attention, and between the Georgian manner and the Italian manner, the earlier French type was definitely superseded.

Nor should it be forgotten that the hotel of today is far more than a study in adapted architectural style. It is an amazing co-ordination of services and conveniences arranged under one roof for the comfort of its guests, and at the same time the architects improved its architectural style in the matter of taste. They also developed its practical features to such a degree that the modern American hotel is considered, throughout Europe, as all that a hotel should be.

Few architectural observers have seemed to notice or point out the close architectural relationship of hotels and town houses, though this relationship unquestionably exists.

The city counterpart of the old mansard-roofed country and suburban houses of the 1880's was the dismal "brownstone front" type, and this thoroughly unattractive dwelling was very similar, inside and out, to our earlier hotels. With the Parisian French manner adopted by the hotel, the same fashion prevailed in the city house, inside and out, as before. The same duplication of style occurred in apartment house design, so that we find the most recent hotels, apartments and city houses are either Georgian or done in a very free version of Italian Renaissance.

At an earlier point mention was made of the relationship of *scale* to the popularity of Italian Renaissance architecture as a medium of design today. The simple fact is that the general scale of the architectural design of the Italian Renaissance is so finely balanced and so adaptable to a variety of types of building that it has been found to be more practical, as well as more pleasing than any other style for the design of city buildings. It is because of this that it has come to predominate in our modern city architecture.

There are, of course, plentiful exceptions, to mention which would involve too much detail, but considering that these statements are necessarily made in sweepingly broad terms, they will be found to be essentially true as outlining the principal changes in the architectural styles of the types of city buildings involved.

It was pointed out a little earlier that the city house is rapidly disappearing as city dwellers show a constantly increasing preference for various types of apartment, and this fact, because of its direct bearing on architecture, may properly be repeated here.

Colleges and Universities

Though for the most part not to be classified among city buildings, the architecture of American colleges and universities should receive attention in this summary.

Few educational institutions in this country have had the advantage of a consistent architectural scheme from their foundation to the present time, and the result has been a distressing variety of styles, including many buildings added to older institutions during the era of architectural bad taste of the 1880's.

Colleges and architects alike have sought to counterbalance the architecture of the past by modern additions of the finest type, and a number of architects have distinguished themselves by designing new buildings which do, in fact, largely offset the mistakes of the past. In the field of college architecture nothing finer has been done in this country than the Harkness Quadrangle at Yale, and other admirable buildings have been added to Princeton, Bryn Mawr, the University of Michigan, and the University of Pennsylvania. The newer college buildings have been designed either in the Tudor "transitional" English Gothic manner of the old colleges at Oxford and Cambridge, or in a free adaptation of brick Georgian, and there are a few institutions like the College of the City of New York, and the Union Theological Seminary which have had the great advantage of being designed at one time as a complete group.

Towering Office Buildings

It is in the design of tall office buildings that our architecture has most definitely broken with the past and developed a type of building unlike anything in the past to which it might be compared—unless we see in it some accidental resemblance to the temples of ancient Assyria or Central America.

But the story must begin with certain of the earlier "Towers of Manhattan" which won for themselves, throughout the civilized world, the name of "skyscrapers." The structural possibility of buildings more than twelve or fifteen stories high came, of course, with the discovery and development of steel construction, which was found capable of supporting a light shell of masonry to a height never before dreamed of as possible. To mount upward into the sky—twenty, thirty, forty stories it was found that all that was necessary was to increase the girth of steel posts and bracing in the lower portion of the building, and stupendous weights could safely be piled above it.

Downtown New York began the erection of tall buildings many of which, once the admiration of European visitors entering the harbor, can now scarcely be seen among the more recent buildings that tower above them. Then came the Times Tower, far uptown on 42nd Street, a design which borrowed the general form of Giotto's Tower in Florence and clothed it in a modified French Gothic detail in terra cotta. Next to gain a height record was the Singer Tower, modern French in detail, shortly followed by the Metropolitan Tower on Madison Square, a gigantic *campanile,* slightly Italian in detail and more definitely Italian in form—and taller than the Singer Tower. It held the height record, as a habitable building, until the Woolworth Building reared its incredible height into the sky—a really colossal building of steel and terra cotta, skilfully designed in an adaption of Gothic by one of America's most able architects, Cass Gilbert.

Within a few years of the completion of the great Woolworth Tower, the architecture of New York, and indirectly, of other cities, was forced into an entirely new style by the passage of a city ordinance whose authors undoubtedly had little if any thought of the extraordinary effect it would have on the tall city buildings of the future. It had been growing more and more evident that a congestion of buildings of great height, rising from comparatively narrow streets, would shut out too much light and air from the street itself. A ratio was therefore worked out which directed that all buildings, according to their heights and the ground areas they would occupy, must diminish as they mounted upward. Towers were, and are, permissible, but the bulk of the building must "set back," as it rose in height.

Without any deep knowledge of architectural design it can be seen at once what occurred, and why all tall buildings now began to take on strange and unfamiliar forms. Up to this time the American architect had not quite solved the design-problem of the tall building, although he had solved, with the association of steel engineers, its structural problem. Efforts were made to distribute "design," in the form of detail, the whole height of the building. Then it became the accepted theory that the tall building might be treated as though it were a gigantic column, with a base and capitol, by elaborating the lower stories and the crowning stories.

A large part of the problem, however, apart from finding a suitable style, was *scale*. What kind of ornament could be devised that would be effective when seen fifty stories or more in the air? Some architects ignored this fundamental question and detailed the crowning stories in the same scale as the first two or three stories of the ground level, with the result that the detail at the top of the building was lost. Consider, for instance, a Renaissance cornice fifty stories aloft.

Many believed that the perpendicular style of the Gothic was the answer, and that Cass Gilbert had effectively solved the design problem in the Woolworth Building.

With the new city ordinance imposing "set-backs" as buildings mounted upward, all the old theories were necessarily swept aside, and the problem largely solved itself. When the mass of a building consists of a piling up of great cubes, diminishing as it grows in height, a cornice ceases to mean anything, and a perpendicular use of Gothic becomes impossible. Architects realized that detail, meaning cornices and various ornamental devices, was now not nearly so important as the general *profile* of the building. Instead of designing with ornament they now had to design with masses. The essential elements of architectural design are lines, areas (or surfaces) and masses (or solids) and of these three elements, masses at once became the most important. And with this new importance of masses our entire skylines are changing and becoming ever more interestingly diversified. Architects are finding new and interesting ways of treating the masses of the new buildings with friezes of colored tile, in the Assyrian manner, or with friezes of bold relief, and already there are a number of towering buildings in New York more truly architectural than any of the tall buildings that first made the American "sky-scraper" famous.

They are more truly architectural because they directly solve the problem of their masses and construction without merely cloaking the problem in a borrowed European style, or making an arbitrary use of a style that has no real relation to their general design.

Such buildings as the Shelton Hotel in New York (Figure XXXI), or the New York Telephone building are *architecture* in the fullest meaning of the word, and represent the finest achievements so far attained in the new type. Every few months new masses and towers mount upward in the skyline of New York. The first of the striking profiles was that of the Bush Terminal building on 42nd Street. Then came the great black tower of the American Radiator building, with its mounting pinnacles of burnished gold. From the massive square tower of the Farmer's Loan & Trust building, opposite the New York Public Library, monstrous chimeras, leaning over the parapet, look strangely down upon the moving traffic of Fifth Avenue, far below. Within a stone's throw distant, the sky is blanketed by the looming mass of the Salmon Tower.

This new architecture has but begun, and already it has so influenced the whole trend of architectural thought in America that its use is growing in cities not affected by the building ordinance that created it in New York.

The beautiful Tribune Tower in Chicago is in the new manner, although its detail is a vigorously adapted Gothic, and architects and critics are in agreement in their belief that designing in masses instead of in the mere application of ornamental detail must inevitably lead to the creation of that thing so long awaited—a style of architecture as definitely American as the architecture of the Gothic cathedrals was definitely mediæval.